

# FARM CHEMICALS

July Volume 122 No. 7 50 Cents

Pioneer Journal of the Industry



## SALES CHART

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**How to Motivate  
Your Salesmen to  
Sell More Fertilizer**

Basic Principles in  
Merchandising Fertilizer  
Special Report on  
The Herbicide Market  
NFTI Convention Report

# Smith-Douglass cuts bag costs with **WONDERWALL**<sup>TM</sup>



Another major user of multiwall bags, the Smith-Douglass Co., Inc., of Norfolk, Va., has reduced bag costs with WONDERWALL, the tougher, cost-cutting new multiwall.

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\*Clupak, Inc.'s trademark for extensible paper, manufactured under its authority.



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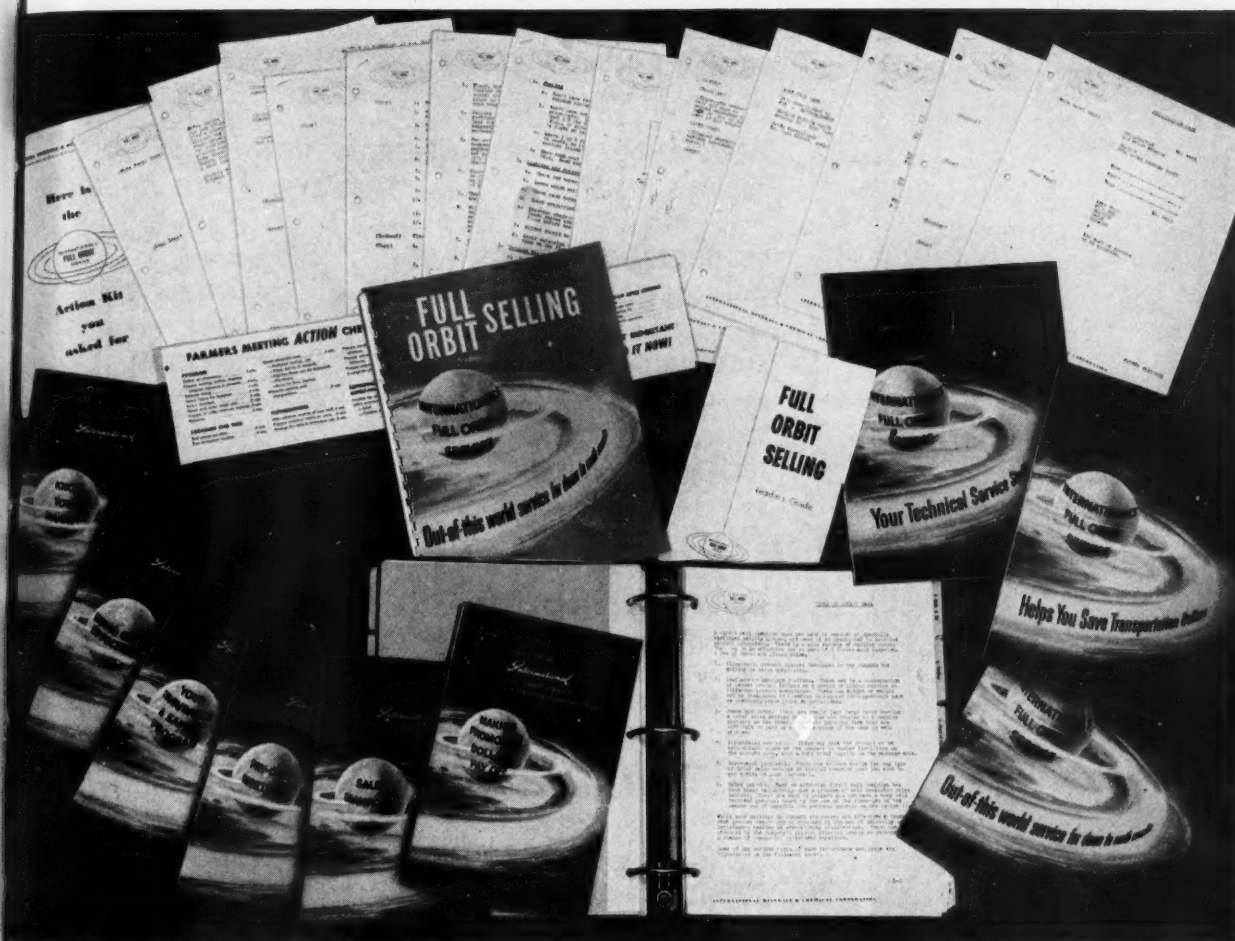
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#### MEMBER BUSINESS PUBLICATIONS AUDIT

The national business magazine for the fertilizer and pesticide industries, **FARM CHEMICALS**, serves primarily those persons responsible for management, marketing and production. It has a qualified circulation for selected executive and supervisory persons within specified segments of these industries, as well as in certain closely allied fields. Subscription rates to all others are: in the U.S., its possessions, Canada, Cuba and Panama: \$6.00; in other countries: \$7.50. Single copy 50 cents. Established in 1894 as *The American Fertilizer*.

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# FARM CHEMICALS

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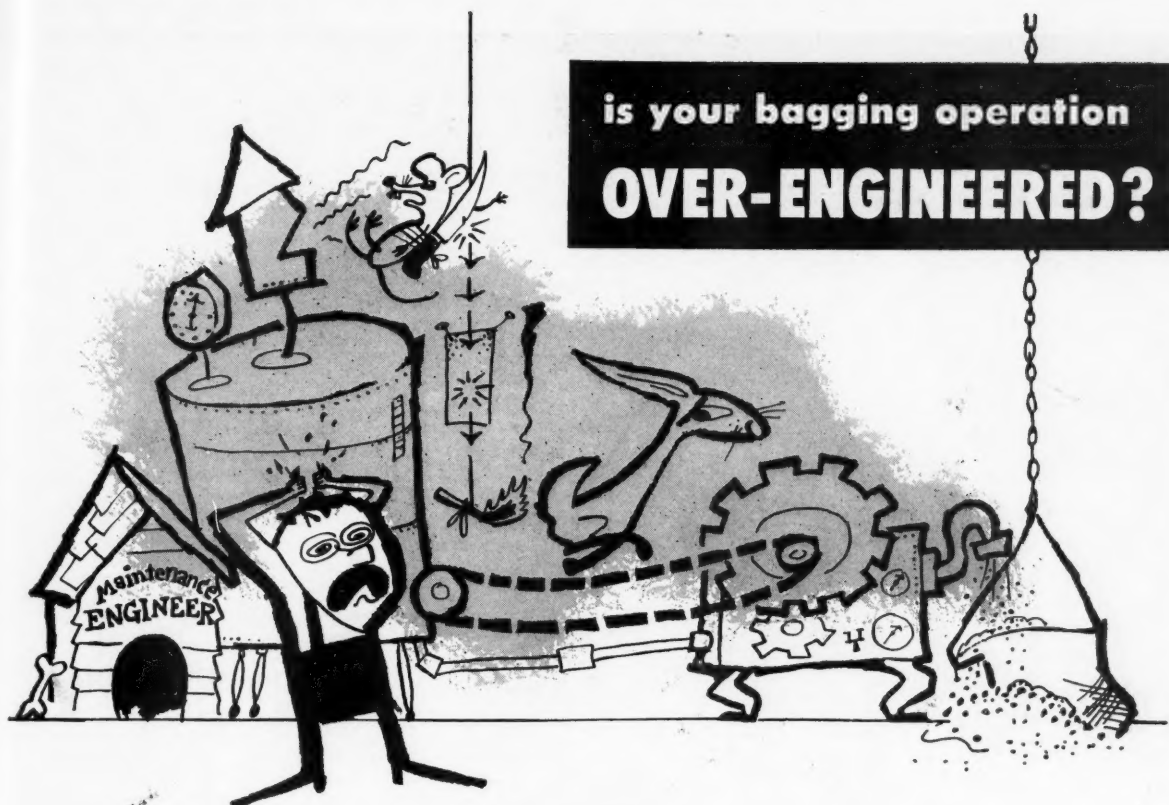
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## THE COVER PICTURE

An intangible element that makes men "want to do their darndest" is responsible for the enthusiastic expressions on the faces of the people on this month's cover. What is it that motivates men to want to do their darndest? Author Erwin H. Klaus answers that question in his article on page 20 of this issue.

FARM CHEMICALS

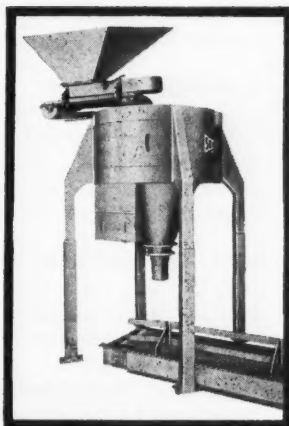


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## You need the new **SOUTHLAND PACKER!**

- **IT'S SIMPLE!** Just one scale system—not two or three—fewer moving parts, wearing points.
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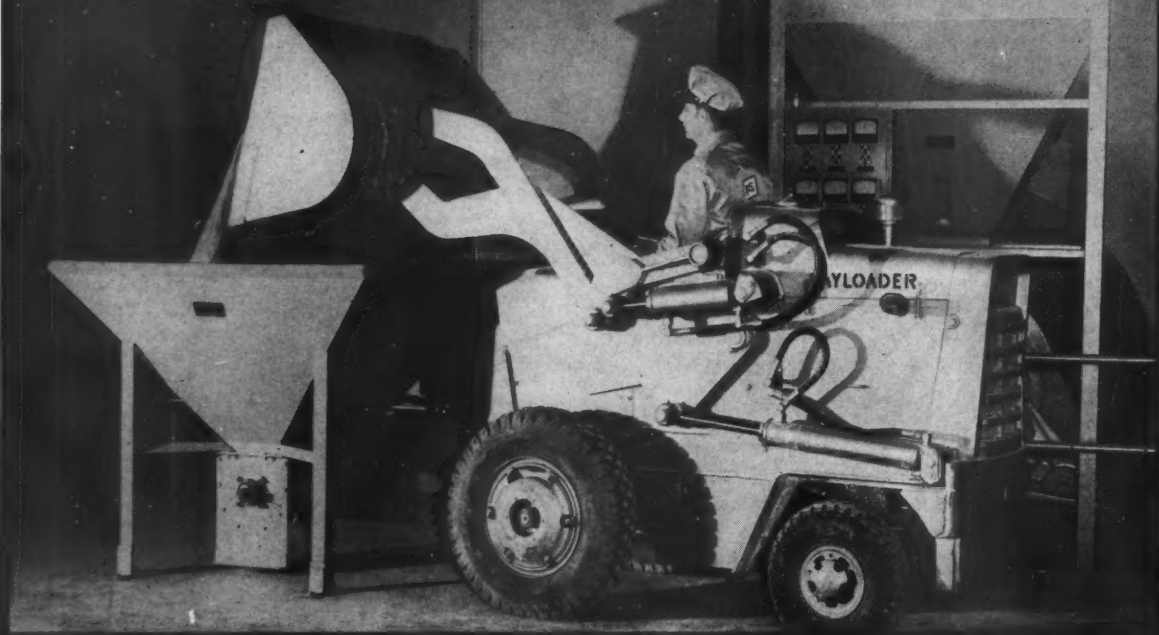
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## There's a big difference in **PAYLOADER®** performance



**Big Load Capacity** The model H-25 "PAY-LOADER" tractor-shovel has a carry capacity of 2,500 lbs. — carries more for its weight than any machine in its class.

**More Digging Power** Breakout force of 4,500 lbs. is available at the bucket cutting edge — more than on any machine near its size. Exclusive power-transfer differential makes traction and "crowding" power more positive, especially when traction conditions are slippery.

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## THE SUPER SALESMAN

Cedar Rapids, Iowa

I read with interest, "Putting The NPFI Super Salesman To Work For You," in your June issue. Would you please send me a copy of the 200 page Fertilizer Salesman's Handbook?

Highway Equipment Company is a manufacturer of the New Leader line of lime and fertilizer spreaders. Naturally, we are interested in the promotion of the use of lime and fertilizer. With this letter you received a copy of our booklet, "Your Land Is Different" that has received very favorable comment from fertilizer dealers and spreading contractors. In fact, two major co-ops made the comment that, "This is the best booklet on bulk fertilization that they have seen."

We'd like to work with others in the promotion of the use of plant nutrients. Please feel free to call on us to lend a hand in any project of this nature.

Respectfully yours,  
R. M. HEATON  
Manager—Sales Promotion  
HIGHWAY EQUIPMENT CO.

Oelwein, Iowa

Enclosed is my personal check for \$1.50 to cover the cost of a "Fertilizer Salesman's Handbook," which is the subject of a feature article on page 30 of your June, 1959 issue.

I would have sent this check to the National Plant Food Institute, but I cannot find an address for the Institute.

Enclosed is a partially addressed, stamped envelope to the National Plant Food Institute. I would appreciate your completing the address and endorsing the check over to the National Plant Food Institute if these handbooks are not available through your office. . . .

Thank you very much for your help.

Even though we are primarily involved in livestock feed production, we do appreciate seeing your magazine each month. Of particular interest has been your recent series on marketing.

Very truly yours,  
MAURICE E. BARINGER  
Nutritionist  
OELWEIN CHEMICAL CO., INC.

*The editors are pleased to note the strong interest in the NPFI Handbook. However, because it is NPFI policy to have members handle such requests, we are returning this letter, requesting that Mr. Baringer contact his supplier.—Ed.*

## A NEW BUSINESS?

Rio Vista, Calif.

I read with interest and a little amusement in the May issue of FARM CHEMICALS that the business of airplane fertilization of hill pastures is at last getting underway in this country. The interest came because I am happy to see my cohorts in the East extending their seasons beyond the short periods of insect and weed control. The

amusement because we have been actively engaged in this sort of work for the past 10 years along with many other California operators. My own planes in fact have applied over 1,000 tons to better than 20,000 acres since last fall.

You may be interested to note that over ¾ of that tonnage was handled in bulk. With two airplanes, Wasp-powered N3N's, we can consistently apply 10-12 tons per hour and empty 25 ton bulk supply trucks in 2½ to 3 hours. This is fast enough to avoid demurrage. To do this, of course, it is necessary to be equipped with good machine loaders.

I was also interested to see the note about grain fertilization in Michigan via top dressing. We also do many thousand acres of this sort of thing by air and it has been very successful both for us and the farmer. This treatment amounts to one hundred pounds of Nitraprils per acre and can very profitably be applied for the figure of \$1.00 per acre that you mention in your article.

I appreciate receiving your publication and enjoy reading it each month.

Very truly yours,  
IRA B. SEIDEN  
Owner  
WESTAIRE SERVICE

## REPORT FROM ALASKA

Kodiak, Alaska

As proof of how much we are benefited by good fertilizers, I am submitting a picture of a 52 pound cabbage grown in the Matanuska Valley near Anchorage, Alaska. Max Sherrod grew the huge cabbage with the aid of good fertilizer. This cabbage was grown in 1958. In 1957 Mr. Sherrod grew a sixty-one pound cabbage; it was 63 inches in girth! He collected fifty dollars for it at the Matanuska Valley Fair Association. He raised three cabbages over 50



pounds each that same year. Mr. Sherrod's daughter and grandchildren are in the photograph.

Sincerely yours,  
JACKIE LUQUE

## ON ELEMENTAL PHOSPHORUS

Richmond, Va.

I read with interest the account in the June issue of FARM CHEMICALS entitled "Phosphoria Gulch" by Robert Ellefsen.

It appears, however, that a correction may be in order.

The statement is made that "The project also marks the first time outside of the Tennessee Valley Authority that anyone in the chemical fertilizer business has attempted to produce high analysis superphosphate by use of elemental phosphorus." The fact is, however, that between 1940 and 1945 the Phosphate Mining Co. marketed a product under the trade name of "Electrophos," testing 50% available P<sub>2</sub>O<sub>5</sub> or higher, which same was produced at Nichols, Florida.

The phosphoric acid used in the production of "Electrophos" was made directly from elemental phosphorus, which, in turn, was produced from electric furnace located at Nichols.

Very truly yours,  
CHARLES E. HEINRICH  
Vice President  
VIRGINIA-CAROLINA  
CHEMICAL CORP.

*Referring to USDA circular 718, "Double Superphosphate," by A. L. Mehring, dated September 1944, we find that Mr. Heinrichs is correct. Phosphate Mining Co., Nichols, Florida, began production in 1938, according to the circular, and terminated production in 1945. Federal Phosphorus Co., Aniston, Alabama, and Piedmont Electro-Chemical Co., Mt. Holly, N. C., also produced double superphosphate with electric furnace acid for several years.*

Joliet, Ill.

Please send us a reprint or tear sheets of the following: "Phosphoria Gulch" by Robert Ellefsen. . . .

Very truly yours,  
MRS. BARBARA BRADY  
Librarian  
BLOCKSON CHEMICAL CO.

## LIQUID FERTILIZERS

Atlanta, Ga.

In your April Volume 122 No. 4 . . . we noted the above subject article ("Complete Liquids: Increase and Uncertainty" by Peter C. Crolus") and found it most interesting. Can you suggest where we might obtain information regarding specifications and formulations for liquid fertilizers as described and discussed in this particular article? . . .

Very truly yours,  
T. E. SCHNEIDER, Jr.  
Executive Vice President  
TESCO CHEMICALS, INC.

# WHAT'S DOING IN THE INDUSTRY

**F  
C**

## INTERIOR ENDORSES PESTICIDE RESEARCH BILL

Legislation now pending on Capitol Hill which would increase pesticide research appropriations has been endorsed by the Department of the Interior. A bill (HR 5813), introduced by Congressman Lee Metcalf of Montana, seeks to increase last year's \$280,000 appropriation to over \$2.5 million. Additional funds would be used to expand the scope and value of research now being conducted to determine effects of pesticides on fish and wildlife resources.

Reported Interior, "Investigations which have been made under existing legislation clearly indicate a problem of much greater magnitude than originally contemplated and show that the existing authorization is inadequate."

A Department report sent to

Congressional Committeemen lists four major objectives of the research program:

1) To determine the acute and chronic toxicities of some 200 basic pesticidal chemicals on the market plus those in various stages of development;

2) To conduct analyses of animal and plant tissue to determine presence of pesticide residues, to develop diagnostic procedures for determining suspected poisonings, and to measure the degree and duration of toxic conditions in fish and wildlife habitats;

3) To carry out field appraisals of immediate and long-range effects of pest control operations; and

4) To facilitate communications of findings to personnel responsible for programs.

Assistant Secretary of Interior Ross L. Leffler, in endorsing the

proposed increase, cited some of the known harmful effects of current practices in the use of pesticides on wildlife and on fresh and salt water fish—in particular effects on wildlife food chains and reproduction. He warned of dangers which may arise from overdosage and pest control programs which affect commercial fish and shellfish populations.

## "GREENER PASTURES" PREMIERED BY DU PONT

"Greener Pastures," a Du Pont-sponsored educational movie on the value of urea for supplemental nitrogen applications to increase agricultural yields and efficiency, was given a premier showing for the press, June 15, at White Sulphur Springs, W. Va., at the time of the annual meeting of the National Plant Food Institute.

Filed mainly in the Mid-Atlantic states and Midwest, the movie (16 mm., color, sound, 12 minutes) compares old farming methods with those of the modern farmer who employs scientific soil-testing and fertilization. Benefits of pasture-building to dairymen and cattlemen, use of urea in aerial spreading, irrigation and in foliage sprays, also are shown.

The movie may be obtained on loan from W. F. Morris, Industrial and Biochemicals Dept., Du Pont Co., Fairfax, Wilmington 3, Del.

## THIS MONTH'S

### Meeting Highlights

#### Tenth Annual Fertilizer Conference Pacific Northwest Plant Food Association

*Winthrop Hotel, Tacoma, Wash.*

July 7. Among the topics to be discussed during the morning session are "Economics of Fertilizer Usage in the Pacific Northwest," "Washington's Fertile Opportunities for Soil Fertility," "Projection of Significant Correlation Data of Fertilizer Experiments," "Cooperative Soil Testing and Forest Fertilization Research Project at WSC," "Present Status and Needs of Forest Fertility Research," "Soil Organisms and Plant Health," and "Soil Sampling for Soil Testing."

A field trip is planned for the afternoon, with F. T. Tremblay, northwestern representative, National Plant Food Institute, in charge of the tour.

July 8. Speakers will discuss "Interactions—Their Meaning and Significance," "Good, Better and Best Fertilization for Western Washington," "Lime and Phosphorus Interactions Affecting the Production of Legumes in the Willamette Valley," "Alfalfa Response to Lime and Sulfur on a High Magnesium Soil in Southern Oregon," "Fertilizer Interactions in Wheat Producing Areas of Eastern Washington," "Residual Nitrogen Response with Wheat in Eastern Oregon," and "Behavior of Water Soluble Phosphates in Soils."

Following luncheon, talks will be given on "The Changing Trends in Turf Fertilization," "Nitrogen Versus Ladino Clover for Milk Production," "Effects of High Rates of Nitrogen Application on Yield of Pastures and Removal of Plant Nutrients," "Relation of Soil Moisture to Forage Crop Production in Western Washington," "How Do Plants Feed?" "Movement of Sulfur as Sulfate in Soils," "Comparison of the Quantity and Quality of Hay Produced from Native Mountain Meadow Fertilized with Three Sources of Nitrogen."

An allied trades cocktail hour precedes the annual banquet.

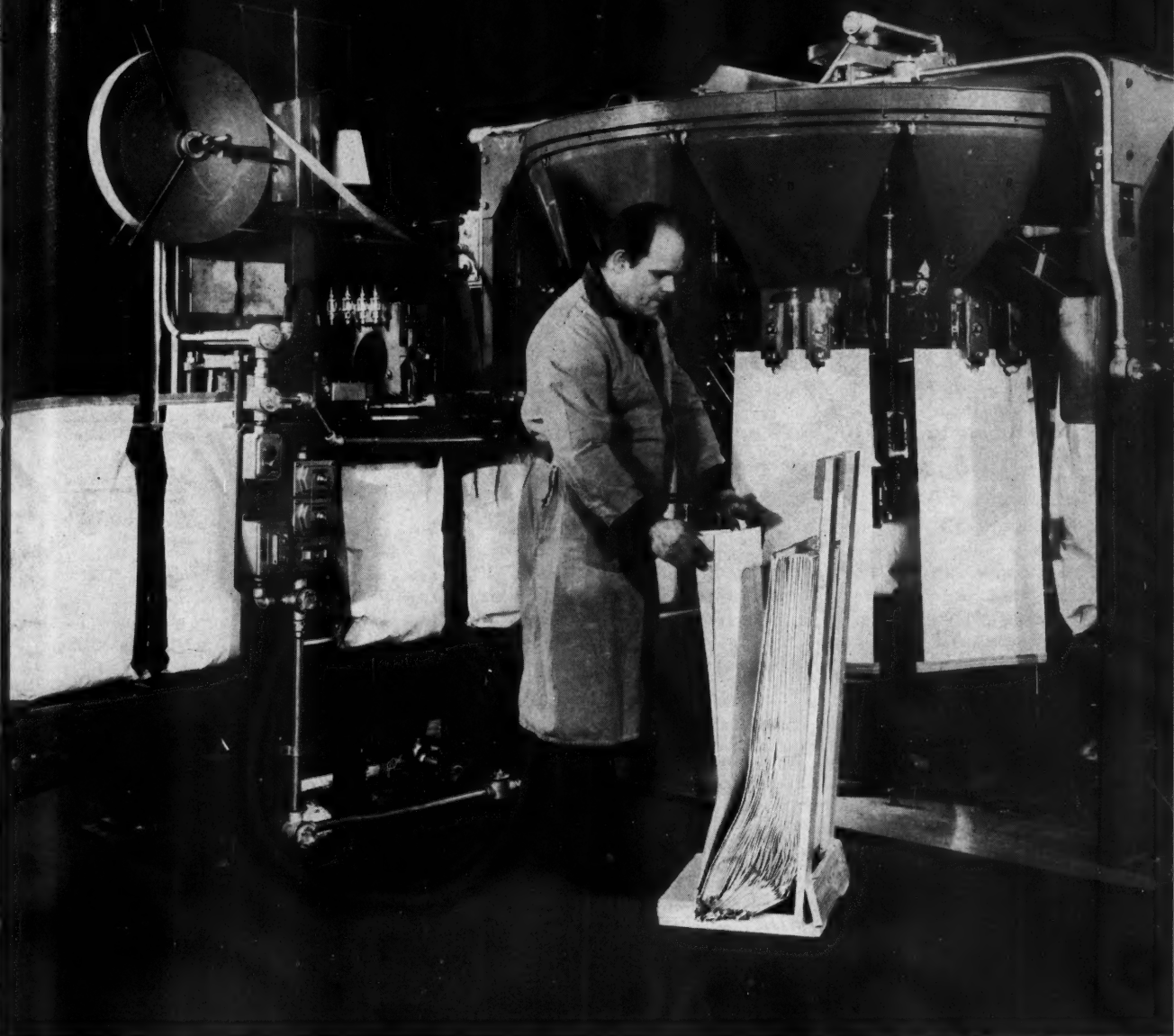
July 9. The morning technical session includes "Summary of Soil Analysis-Plant Analysis Studies in Western Washington, 1940-1952," "Correlation of Boron Tests with Response to Boron Fertilization," "Interpretation of Soil Moisture and Nitrate Tests for Nitrogen Fertilization on Wheat," "How to Make Tissue Tests on Some Major Crops," "Results of Soil Sampling Contest," and "Correlation of Soil Tests with Field Response to Applied Fertilization in Washington, in Oregon, in Idaho."

## NEW NPFI MEMBERS

During the board meeting held at the National Plant Food Institute convention last month, three firms were elected to membership: The Best Fertilizer Co., Lathrop, Calif.; Bradford Fertilizer and Chemical Co., Aurora, Ontario, Canada; and Mid-South Chemical Co., Memphis, Tenn.

## FRONTIER BUILDS RESEARCH, DEVELOPMENT FACILITIES

Wesley H. Sowers, president of Frontier Chemical Co., Div. of Vulcan Materials Co. announced recently the signing of contracts for construction of a new research and development building near Wichita, Kansas.



## Famous Model "AF" Bagpaker weighs, fills, settles and closes a 100-lb. bag every 2½ seconds!

WITH THIS engineering marvel at his command, the *one man* in our picture can package from 15 to 25 BPM. And he can *instantly* adjust the rate of speed through the machine's variable drive.

The operator simply hangs empty multiwalls on the hopper spouts as the 10-station turret rotates past him. The Model AF Bagpaker takes over from there.

It accurately *weighs* any free-flowing or semi-free-flowing material, quickly *fills* the bag, *settles* it by vibration, automatically *preforms* the top, and *stitches* it tight. You can choose from nine different closures. Bagpak's exclusive "Cushion

Stitch," a reinforced two-thread double-lock chain stitch, is standard equipment.

The Model AF Bagpaker is ruggedly constructed of heavy welded steel throughout. Gears are fully enclosed and bathed in oil. Critical parts are of *stainless steel*.

There is a Bagpaker model for every need. They range from the completely automatic Model "A" Bagpaker, capable of packaging up to 60 tons per hour, to small, manually operated economy models.

Whatever your multiwall packaging needs, it will pay you to talk to your Bagpak sales and service representative.





# WASHINGTON VIEWPOINT

F  
C

► *Economists dig into the basic problem of why farmers are not sharing in the national income rise in the face of agriculture's technological revolution.*

► *Odds are against a big overhaul in the farm program by one omnibus farm bill. As crop emergencies arise, action will be taken for the individual commodity involved.*

► *Department of Interior endorses legislation to increase pesticide research funds by a whopping ten-fold: From \$280,000 to \$2.5 million a year.*

**Are farmers over-sold on technology?** This question now is increasingly being raised in government, congressional, farm organization and extension circles. It comes up as economists dig deeper into the basic problem of why farmers are not sharing in the national income rise in the face of the technological revolution in agriculture.

*Significance of this new look* at the farmers' problems lies primarily in the impact resulting publicity may have on the farmers' purchasing plans.

**The farm chemicals industry,** however, is not coming in for criticism in studies which indicate farmers need to re-evaluate the benefits they receive from technology. This, of course, is due to the nature of the farmers' chemical and fertilizer investment—primarily an annual investment whose economic benefits are readily visible. The culprit, as the experts see it, is mechanization.

*Farm equipment & machinery industries* are due to take the heat stemming from charges of over-selling, along with the Extension Service and other farm advisers to the extent that they sell technology for technology's sake—and not technology for the economic benefits that may be derived.

**A recent study of what's happening in agriculture** illustrates the reasoning behind claims that farmers are being over-sold on mechanization. According to government figures, *farm production* went up 18% between 1947 and 1958, but gross cash farm income held relatively steady at about \$30 billion. At the same time, *farm costs* went up 28%. Thus, the farmer spent 28% more in costs to increase production 18%—just enough to maintain, but not increase, his gross earnings.

*Furthermore,* and contrary to general belief, unit costs of production have not been cut by mechanization. Out of each dollar of sales income, the farmer now has about 82¢ in cash expenditure for production items. This compares with 65¢ in the base period

1947-49, and with 92¢ in the depression thirties. Output per man hour on the farm has increased 32% since 1948, but output per unit of farm machinery and motor vehicles has *declined* 40%, according to the study.

*Also, net inventory of farm machinery* and motor vehicles has increased from less than \$7 billion to \$18 billion, while crop and livestock inventories now are valued at slightly less than the \$22 billion of 10 years ago. Farm labor cost has declined only \$220 million a year for 2 million less hired men, while depreciation on equipment at a 10% rate went from \$700 million to almost \$2 billion a year, and over-all capital depreciation went from \$1.6 billion to \$4 billion—during the 1947-58 period.

**The study concludes:** "The decreased use of farm labor, on which justification for the use of more and better farm equipment and larger farms is largely sold to farmers, has been sales promotion use of technological theory, not based on economic advantage to agriculture. Industries supplying the farm market pass along up to \$5 billion a year to cover their higher costs by means of higher prices, and processing and handling industries pass back about the same amount by paying less for their farm-produced raw materials."

"It hardly looks as if improved technology will pay for itself down on the farm in the foreseeable future, as long as the economic benefits are absorbed in increased costs by suppliers of equipment and materials, and production, marketing and transportation services," the study says.

It suggests that farmers get greater control over their crop prices through "bargaining power."

**Investigations into pesticide effects** on fish and wildlife should not be under-estimated. Federal and congressional interest is beginning to mushroom, and there's no telling how far such probes will go—or what they will come up with, or what changes in current law will result over the long pull.

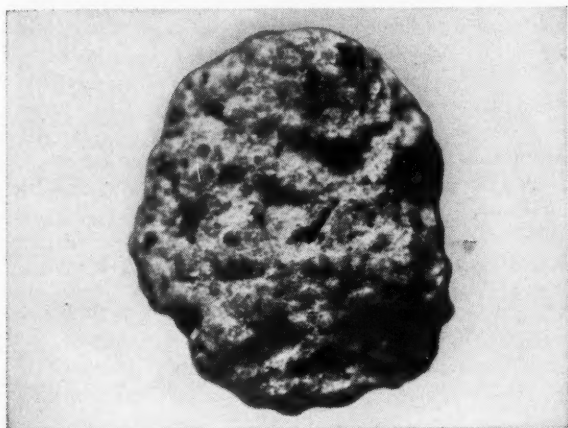
Significantly, the Department of Interior has endorsed legislation to increase pesticide research funds



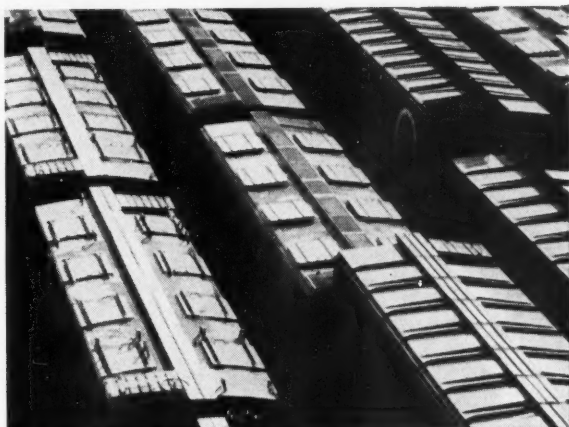
# Team up Cyanamid's phosphate products and services for superior mixed fertilizers, economically produced

At Brewster, Florida, Cyanamid mines high grade phosphate rock and manufactures quality TREBO-PHOS\* Triple Superphosphate and phosphoric acid.

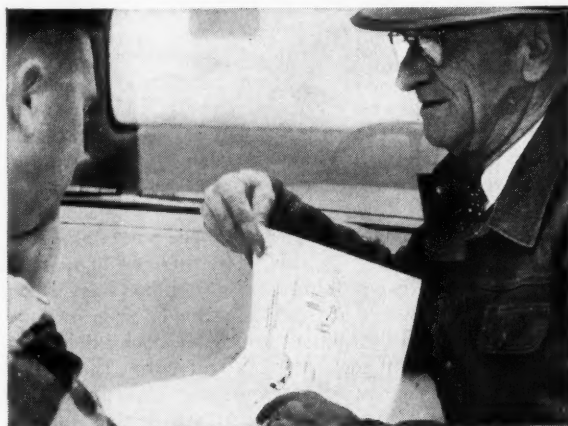
Add to these fine products Cyanamid's technical and traffic service and you've got an unbeatable combination. Here are a few of the ways Cyanamid helps you manufacture better mixed fertilizers for less money.



**Product quality**—Porosity of magnified (30x) TREBO-PHOS granule shows why it ammoniates up to 5% without evolution of fumes. Porosity is *controlled*; TREBO-PHOS does not pick up moisture readily, produces a dry, drillable, well-conditioned fertilizer.



**Shipping service**—Cyanamid traffic experts are experienced at routing phosphate shipments to eliminate avoidable delays. Your plant keeps humming along on schedule. This service is yours when and as you desire it.



**Product planning**—Cyanamid Technical Service personnel have country-wide experience in formulation and manufacture of mixed fertilizers at lowest cost. Often, what may be new problems for you, are solved problems for them.



**Manufacturing assistance**—Cyanamid people are versatile. They work where you work, help you get more out of your facilities. Often, they have suggested changes in procedure that have resulted in better mixed goods, produced more economically.

\*TRADEMARK

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American Cyanamid Company, Phosphates and Nitrogen Department, N. Y. 20, N. Y.



# What's Coming Next Month

In most cases, your dealers are farm-bred people. Is there a possibility that they may not see the farmer as he *really* is? Rather, they see him as "father," "mother," or "grandfather?"

This question is an important one to fertilizer and pesticide manufacturers. Next month, one of our authors delves into . . .

## ■ THE FARMER AS HE REALLY IS

Too many dealers see the farmer with affection; they may even see him as the prototype of some vanquished American virtue. "This is fine, but it's *poor business*," says the author. With this, he goes into detail on what the records show about the farmer's education, health and other factors that we must understand if we are to sell him our products.

## ■ HOW TO BE SMALL AND COMPETE

The logical answer to that would seem to be: *get bigger*. But for the past two issues, we've been showing you how small fertilizer-pesticide operations on the West Coast are successfully competing with mammoth cooperatives on the strength of their services. Completely integrated, they mix and formulate for local needs, provide application service, technical consultation and some farm business management consultation. Another in our series will reveal an unusual *department store* operation which deals in everything from fertilizer mixing to women's dresses!

## ■ FARM MANAGEMENT'S FACTOR "X"

Would you agree that farm chemicals constitutes the most important item on the farm and, usually, the *determining factor* of economic farm management? Next month, an outstanding agricultural economist will discuss the validity of this concept.

... in the new

# FARM CHEMICALS

BPA

## WASHINGTON VIEWPOINT

of HR 5813 and the companion S 1575, which would raise the current research authorization from \$280,000 to \$2½ million a year. Furthermore, Interior, speaking for the Fish & Wildlife Service, asked that it be permitted to request additional funds from time to time "as required by circumstances."

**Objectives of stepped-up program**, according to Assistant Secretary Ross Leffler: (1) To determine the acute and chronic toxicities of some 200 basic pesticidal chemicals on the market, plus the many which are in various stages of development; (2) to conduct chemical analyses of plant and animal tissue to determine the presence of pesticide residues, develop diagnostic procedures, and measure degree and duration of toxic conditions in fish and wildlife habitats.

Also: (3) To carry out field appraisals of immediate and long-range effects of pest control operations upon fish and wildlife populations, and (4) to facilitate the compilation and dissemination of findings from research studies "so that chemists, entomologists, and others may apply such knowledge in the development of new pest control materials, formulations and techniques of application to minimize hazards to desirable forms of animal life."

**Leffler observations:** Some chemicals persist in the soil for periods of 3 to 5 years or longer. Certain food chain organisms such as earthworms tend to concentrate the poison in their body tissue. Birds and fish are affected when they feed on contaminated organisms.

Game birds exposed to sub-lethal amounts suffer delayed chronic effects in the form of reduced reproductive capacity and survival of the young. Use of some materials against mosquitoes is toxic to shrimp. Crabs may be killed by eating fish flesh containing low levels of some chemicals.

**Major revision of the federal farm program** now is expected to come gradually, with odds against a big over-haul by one omnibus farm bill. Prevailing opinion in Congress is that the current program will rock along until individual crop emergencies arise, at which time action will be taken to combat the emergency for the individual commodity involved. For example, about the only interest either the government or Congress has in farm legislation this year is for wheat, which is the Number 1 emergency crop. Meanwhile, President Eisenhower is taking a greater personal control over federal farm policy. While he is not short-circuiting Secretary Benson, there's mounting evidence that he is taking advice from farm leaders who hold viewpoints differing from those held by Benson. For example, the White House over-rode Benson's decision not to purchase frozen eggs to bolster the sagging poultry market and ordered a buying operation. Ike's greater interest, furthermore, is expected to show up in Administration relations with Congress. He is said to believe that his "team" is not doing as much as it could by way of compromise to reach a solution to the farm problem.

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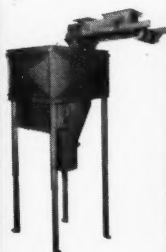
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# *Tested ways to convince your prospect that*

"CAN'T you do any better?" "That's more than I wanted to spend." "Sorry, but it's way over our budget."

Despite your skill as a salesman, the depth of your product knowledge or the lengths you may go to determine a prospect's needs, one hard fact remains: scarcely a sales interview fails to rear the ugly head of price.

What can a salesman say—what can he do—to overcome this standard objection?

Those who have mastered it offer many solutions. But essentially their advice boils down to this: make some other consideration so overwhelmingly enticing that price takes its rightful place in the prospect's mind—second.

### ACCENT THE BENEFITS

"When a man expresses anxiety about your price," says John Kennedy, assistant sales manager of Stauffer Chemical Co., "he is really challenging you to prove that your product is worth the money. One of the very best ways to do that is to build up the desirability of the benefits you are offering in such vivid, personal and irresistible terms that they crowd out of your prospect's mind any concern over the amount of money you are asking him to part with.

"Our men are trained to emphasize the *exclusive* features of our products, then to translate them into benefits that no competitor can match because they are patented or otherwise restricted in availability. A prospect could scour the world and still not find the precise benefits we can offer him.

"Once he is made to realize that, his concern with price pretty much dissolves."

Some examples of "exclusive selling:"

"It's made from our own secret formula."

"The only machine of its kind that runs on batteries—you can use it anywhere."

"It's tougher because it's made from Kraft paper that stretches."

"Check and double-check," says Eugene Darwin,

# THE PRICE IS



sales manager for Republic Chemical Corp. "The prospect who can't see the benefits for the dollar signs hasn't been sold on the uniqueness of your product. We tell our men to 'sell the difference'—that is, to pinpoint the precise ways in which our chemicals and service stand out from anything the competition can offer. In the case of our copper sulfate, for example, we stress our unique guarantee against caking or lumping.

"You can talk yourself hoarse on the features your product has in common with the competition and not even dent a prospect's armor. Your product is 'just as good?' Who cares! But concentrate on the differences—thereby removing your product from comparisons—and your customer can't say, 'It's too expensive' because cost is a relative thing. The price of whatever you're selling is high only if the identical product can be purchased elsewhere for less money. The more ways in which you can prove that you're selling something unique, the less important price becomes."

But what if there are no discernible differences between your product and the competition's?

"Then make *yourself* the difference," advises Ralph Werley, sales manager for Jefferson Chemical Co. "By helping the prospect solve his problems, bringing him the latest news in your field and generally proving yourself a knowledgeable trouble-shooter, you can convince him that your higher price is well worth it in terms of personalized service."

#### **MAKE IT EASY TO PART WITH THE MONEY**

What really bothers some prospects who hide behind the price objection is the idea of suddenly parting with a sizable amount of money

But show them how they can cushion the blow to their wallets—actually or psychologically—and you may walk away with the order.

Thus, the top salesman for a tractor firm has found it surprisingly easy to sell his more expensive line by breaking down the cost in a novel way.

"For only an additional eight cents per pound," he explains, "you can own a machine that delivers twice the power of the standard model."

Many salesmen find it useful to play up the unusual terms they can offer a prospect. "You needn't pay for six months." "Charge it." "Take up to three years to pay." "Suppose we bill you for this on your next regular order?" "With the attractive trade-in we can allow you on your old machine, this will actually cost less than you were expecting to spend." "A small deposit makes it yours."

Another approach centers about the provable fact that quality costs less in the long run.

S. Wagner, president of Garfield Williamson Inc., lawn specialties producers, instructs his sales representatives to explain that their more expensive seeds guarantee a permanent lawn. "The initial investment is higher, of course," says Mr. Wagner, "but since lawns are an annual affair, it is actually more expensive to buy cheaper seeds that must be replaced every year."

Salesmen for the U. S. Tires Division, U. S. Rubber Co., also stress the long-range benefits of value. Supervisor of group training John N. Spain explains: "A substantial part of a tire's value resides in its 'carcass,' the basic product of the tire industry. If a man buys a high-quality tire, one with a strong carcass, he can be sure that when the tread is gone, he can have it recapped and get thousands of additional miles out of it. A cheaper tire, with a less sturdy carcass, is riskier. So our men say, 'The price is higher, but the cost is lower.' It's an important distinction. For a few extra dollars now, the buyer can substantially reduce his per-mile expenses in the future."

#### **PROVE THAT HE'S SAVING MORE THAN HE'S SPENDING**

Few people mind spending more if really convinced they are getting more. Therefore, a persuasive answer to the price objection can be the valuable extras your higher price includes.

# **SECONDARY**

by TED POLLOCK

*Industry men and others describe their methods of overcoming price objections in this, the third in an FC series on "Successful Salesmanship"*

## MARKETING

Possibilities: unique guarantees of service and parts replacement; free use of company resources (reports and newsletters, consultations, soil analyses, point-of-sales material, promotion planning, cooperative advertising, sales training for dealer personnel); new ways to get double or triple-duty from your product; its proven fast rate of turnover.

Many salesmen successfully overcome the price bugaboo by showing how their product pays for itself. "This fertilizer is so effective, it will more than return your money in bumper crops." "This equipment won't rust." "It's an investment." "By eliminating three of the steps in your present routine, our service will save you over 2000 man-hours annually; it's like getting another employee free." "It does the job in half the time."

Roy L. Cammann, vice-president in charge of sales for the Barrett Division of Allied Chemical Corp., has found one technique particularly effective. "By far, Mr. Prospect," he says, "the major expense in roofing is labor—an expense that is identical whether you use a cheap material or a more expensive one. Since the more expensive one will last about twice as long as the other and only costs 15 cents more per square, doesn't it make sense to cut your labor costs in half by roofing with the best in the first place?"

In short: whenever possible, show your prospect with mathematical logic that your product or proposition doesn't "cost;" it pays.

### DRAMATIZE THE PENALTIES OF NON-OWNERSHIP

"Mr. Jones didn't think he could afford our fertilizer, either—until he actually experienced the disappointment of decreased yields."

"The extra safety factors built into our product will slash lost time due to accidents."

"The close quality controls under which our fertilizers are produced means that you're getting exactly what you're paying for."

Price suddenly shrinks in importance when your prospect recognizes how expensive *not* owning your product can be.

Thus, salesmen for a farm machinery firm break

### THE POWER OF POSITIVE PRICING

Few people really know what the price of your product should be. You set the climate. Quote your price apologetically and they'll shy back. Introduce it with confidence and usually they'll accept it.

Example: the shoe salesman who told a customer the pair he liked cost \$29.50. The customer said O.K. The salesman went off to get the shoes wrapped, was back in a minute with an apology. "I'm sorry," he said, "I made a mistake—the price is \$24.50."

The customer was prepared to pay \$29.50 because the salesman sounded so sure of himself.

You?

through the price barrier by playing up the rugged dependability of their products. The vice-president in charge of sales expands: "Our customers are frequently racing deadlines. Failure to meet them can cost a farmer thousands of dollars in lost crops—and sales. We make it abundantly clear that the performance and consequent peace of mind that is built into our machinery are more than worth any small price differential."

Whenever a top salesman for an East coast chemicals firm hits a snag in the form of, "I can't afford it right now—see me next month," he pulls out a card from his wallet.

"Fine," he says. "Just fill in your name and sign this guarantee:

"I, . . . . ., hereby guarantee that my crops will wait 30 days for the nourishment they need.

(Signed) . . . . ."

"Its impact on the price-wary prospect is electric," he reports.

Salesmen for an agricultural fencing company keep their eyes peeled for newspaper reports of farm losses due to theft, cattle straying, weather damage, etc. Armed with those vivid persuaders, they call on farms in the immediate vicinity of the recent mishap. With his neighbor's loss fresh in mind, it's a rare prospect who worries over the price of a new fence.

### GIVE HIM A TASTE

According to William Chadwick, manager, Agricultural Potash Division, International Minerals & Chemical Corp., verbalizing is no substitute for experience.

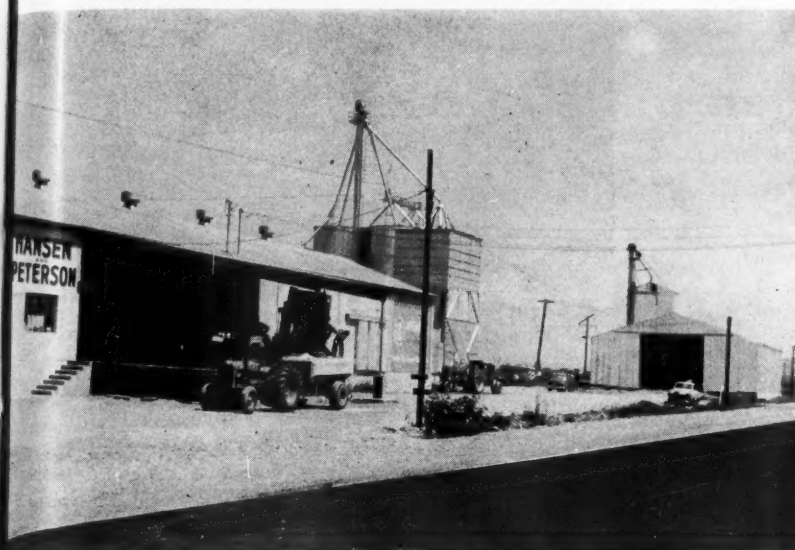
"The price objection," states Mr. Chadwick, "often means that you haven't sufficiently dramatized the quality of your product. This can best be done with a demonstration. For example, a salesman might suggest to a prospect, 'Why don't you take just one ton of my product, set aside a field in which to use it and see with your own eyes the improvement in your yield?' The magic formula, if you can call it that, is a simple invitation: 'Try it!' Or, a representative might arm himself with a series of slides of crops that were raised in the past with the help of his firm's product and invite the prospect to study them through a hand viewer."

Similarly, the branch manager of a farm machinery firm finds that one demonstration ride is worth a thousand words in getting the prospect's mind off the price tag.

And whether you're selling nuts or nitrates, telephones or tractors, pencils or potash—there's nothing that can't be demonstrated.

Perhaps the ace salesman for a large construction machinery firm best sums up the whole price question with this simile: "Every product is like a pie cut into eight parts. These slices are workmanship, durability, dependability, quality, prestige, service, extra values and price. Since the part is never greater than the whole, why should price ever be the determining factor in a sale?"

Why indeed? ▲



“You  
either  
have to  
**GROW**  
or get out!”

*says Dick South, of Hansen and Peterson. Using new methods, plus personal service and custom application, H&P has made tremendous strides in four years.*

By HOMER HATHAWAY

**T**HE FERTILIZER and pesticide division of Hansen and Peterson, Mount Vernon, Washington has only been in its present location since 1955, but it has made tremendous strides in four years time. Seven-league boots which accomplished this come mainly under three headings—personal service, custom application and the use of new methods.

When talking to Chris Hansen or Dick South, two of the partners in the business, you get the impression that “new methods” are one of the things out of the three mentioned which has been principally responsible. The firm is always watching for new developments in the field, and if such developments are applicable to the farmers they serve, they aren't afraid to take the “deep six” and plunge in with a capital investment risk.

“We don't try to sell a farmer on how much money he can save by doing business with us,” said Dick South. “We show him how much he can increase his yield and thus make more money from his land.”

The same theory applies to their own risk-taking where the adoption of new techniques and machines are included. If any proofs were needed as to just how this policy has worked out, all one has to do is look over the very modern Hansen and Peterson plant. But it also shows up someplace else which is even more important—in sales volume!

When Dick South came to Hansen and Peterson in 1952, the sales volume of farm chemicals stood at about 7 per cent of the whole. H&P were mainly involved in the feed and seed business at that time,

but they could foresee a big future for insecticides and fertilizers, and they wanted in on the ground floor. They got there in a big way. Sales volume of farm chemicals now constitutes about 50 per cent of the overall figure, and even the feed and seed business has increased about 50 per cent. So, the decision to plunge in with both feet appears to have been a wise one.

Dick South brought not only an intense enthusiasm for agricultural chemicals with him when he entered H&P as a partner, but he also brought an extensive background in experimental work in the field. He and Tony Romano (now owner of Quincy Farm Chemicals and covered in an article in FARM CHEMICALS, June issue) were employed by another feed and seed company. Their employer decided against investing heavily in farm chemicals and the boys split up, Dick to come to Hansen and Peterson, Tony to set up his own business. Although they worked together in the field, each has now come into the business in a different field, with Romano stressing liquid (which serves his customers best), while Dick's business is based mainly on dry fertilizer and bulk handling. Both, however, are engaged in the other phase to a limited, but necessary, extent.

Dick has worked out a method of working with customers which benefits not only the farm chemicals end of the business, but has also been responsible for the increase in the feed and seed end. H&P uses a method whereby they plant and fertilize a crop at the same time, using their own equipment, which is



## MARKETING

rented to the farmer, who generally does the work himself.

"This type of operation hits its peak in April and May, and we just couldn't keep enough help to handle the actual planting ourselves. But we do furnish the equipment, the seed and the fertilizer and the complete package operation has turned out well."

This particular operation has worked extremely well for the varied truck-garden crops raised in the vicinity—spinach, carrots, corn, cucumbers, broccoli and cauliflower.

"We developed the equipment ourselves, since there was nothing on the market to handle the problem," said South.

And "problems" are just about an everyday occurrence in this business, since the crops in the area are so diversified. Instead of having two or three main money crops, the farmers go in for a tremendous variety of crops. Beside those mentioned above they raise sugar beet seed, spinach seed, cabbage seed, hay and grass (for the dairy industry), pea crops (for frozen food processing), sweet corn, strawberries, and some are getting into the grass seed business.

Now every one of those crops would present a special fertilizer problem in itself, but the varied types of soil to be found in the area also present a problem, so that "custom-mixing" for H&P means a tremendous variety of mixes.

But it wasn't all easy! It has taken a good deal of intensive education to show the producers that they can get better crops and make more money through the use of fertilizers, whether liquid or dry. The liquid business in the area, several years ago, fell into the hands of "gyppo" operators who went around and charged a farmer so much a gallon, and then promised miracles. When the miracles failed to materialize, the farmers turned thumbs down on fertilizers, especially liquids, and changing their minds hasn't been easy.

However, Dick South figured that there must be

One of the employees transfers fertilizer from a hopper mounted on a lift-truck to the bulk spreader.



Chris Hansen and Dick South at work.

some kind of method he could use to get his message across, and he found it in the use of vocational agriculture students and FFA members. These young men are paid \$1 for each soil sample they bring in from prospects. These are then sent to the Yakima testing station of Washington State College, or, if in a hurry, are tested by a local expert. By showing these future farmers how important soil testing is, Dick South is creating now only a future market, but the youngsters have proven to be pretty good at convincing their dads that there is something to this fertilizer business after all.

Bulk handling has proven to be a real boon to H&P's operations, also.

"With just one spreader we have banded about 1000 acres of custom application in 3 or 4 weeks," said Dick South. "Of course, our big volume is done in dry fertilizer in this area, and we use mainly a phosphorus type, which we band, we don't broadcast."

As to how the co-ops stack up as competition:

"We've had no real trouble thus far, although we anticipate there may be some in the future. Actually, one of the local co-ops distributes our brand of fertilizer through its own store. I think we provide a better personal service than the co-ops do. Their workmen are like workmen in almost any line of business—they are on a weekly salary, work from 8 to 5, and then the doors close they are off the job until the next day. We keep up better, I feel, on new approaches to problems in the industry. We try to anticipate future problems. This is the kind of a business where you either have to grow or get out."

It is apparent that H&P has grown, with their present capital investment around \$100,000. Their plans for the future indicate that growth will continue. Those plans include getting into bulk on a much larger scale, possibly with the addition of equipment to unload hopper-type cars as well as to add more bulk storage facilities.

The percentage increase in sales volume in seven years for H&P proves that an aggressive organization can create a market for its product, but accomplishments such as these are not made by an organization that sets back and waits for business to come to it. The groundwork and education may be done by someone else, but the fellow who does the spadework is going to be the one who realizes the profits rather than the guy who tries to cash in on a created demand.

As Dick South said, and it bears repeating:

"You either have to grow—or get out!" ▲





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# HOW TO MOTIVATE SALESMEN to sell more fertilizer at a profit

By ERWIN H. KLAUS

**T**HIS IS A LONG TITLE. Addressed to almost any industry other than plant food, it needn't be this long. It could stop at the fourth word, to wit: "how to motivate salesmen." That won't do here because an essential element is missing. The element is *leadership*, because motivation of men depends entirely on the ability of leadership to inspire. The evidence that such leadership is prevalent in the fertilizer industry is so spotty as to be nearly absent.

Enough evidence to that effect can be marshalled to fill the pages of an entire issue of this magazine. So let's just take a look at a few items of evidence to illustrate the picture.

*From 1944-45 to 1952-53, the highest fertilizer consumption year, fertilizer sales in the continental U. S. rose 74.5 per cent. Since that year annual fertilizer sales either decreased or just about held their own. 1957-58 sales, for example, were 8.9 per cent below the 1952-53 figure.*

Now observe that this stagnation in the market place occurred when crash and panic selling became the order of the day... when manufacturers and dealers began and kept on falling all over themselves selling it still cheaper, offering still more ridiculous credit terms.

## "WE HAVEN'T BEEN COMMUNICATING"

"Why," asked FARM CHEMICALS editorial last month, "can't fertilizer dealers make prices stick? Why can't they use other selling tools to advantage?" It suggested as answers: "poor attitudes in the first place and inadequate knowledge of fertilizers in the second place."

"The barriers to proper fertilizer use," declared Dr. Russell Coleman, executive vice president of the National Plant Food Institute in its recently published FERTILIZER SALESMAN'S HANDBOOK, "must be broken down if we are to sell the amount of fertilizers that farmers need. The fact that they are so strong means only one thing... *we haven't been communicating with our customers.* At least, they haven't got the point. And if that is true, we haven't been putting it over too well."

Dr. Coleman hit the nail on the head—"we haven't been communicating." Not only with our customers (ultimate users), but not with our dealers either. Dealers don't create programs, and a price policy has to be part of a marketing program. And dealers are not going to sell by making use of the extensive technological knowhow available to them unless they can do so at a fair profit. So the question is, how is the

industry going to get this chain reaction rolling in the opposite direction?

## GET MARKETING LEADERSHIP

The fundamental answer to that question was furnished in my earlier article, "How to Put Muscle in Your Marketing." (February, 1959 FARM CHEMICALS, page 14). But to create and direct the integrated marketing program outlined therein takes leadership... a highly developed leadership capacity that is profit-minded, bent on innovation and purposeful planning, willing to encourage, recognize and reward good performance, and able to imbue common men with the spirit to do uncommon things.

So if you are willing to put an end to profitless and mediocre selling, take a good hard look at your company and determine if you now have in your ranks the leadership capacity it takes. If you have, pick your men and give them full responsibility with commensurate authority for building your new marketing program. If you haven't, get the men you need. Chances are you won't find them in the fertilizer industry. So don't be afraid to get them outside the industry. There is plenty of evidence on hand that it takes a good marketing man far less time and effort to learn the intricacies of an industry than it would take a fertilizer executive without marketing training and "instinct" to find out how to create and direct a marketing program, if indeed he could.

As stated at the outset, this ground needn't have been covered if the advice on "how to motivate salesmen" were addressed to almost any other industry. To recognize its shortcomings isn't a particularly hard pill to take for a company if it is led by men intent on doing the right thing. To some it may be a big if, but after all, many of the corporate executives in the industry gained their knowhow and experience when they were not facing today's marketing challenge. Any of us need people who can wield a corrective influence on us when our skill in identifying and dealing with problems exceeds our facility in solving them. That is simply a human need.

You now have the people who can initiate and direct planned efforts for creating a new, a higher standard of selling performance that will successfully sell the built-in user benefits of fertilizer at a price fair to buyer and seller alike. Sell to whom? To farmers, to dealers, in fact to all factors that influence the market's response.

How do we motivate men to do just that? The principles of motivating salesmen do not apply to any one industry—they apply to people. People respond to leadership that is itself spirited, and there-

fore can create spirit in an organization. And in the difference between an organization of men moved by a spirit to achieve or being void of such spirit lies the difference between a good profit and a poor profit.

### THE BOSS MUST BE A SALESMAN

King Wilkin, president of the Zellerbach Paper Company, knows about the difference between a good profit and a poor profit. He knows how to lead his people so they will make a good profit. "You lead," he says, "by living with your people, if you please in shirt sleeve, give-and-take fashion, and you do it with the gloves off but with love, affection, understanding and a fair degree of tolerance. One other priceless ingredient of this management formula is that *the boss must be a salesman*, not dealing in glittering promises, but being *honestly so enthusiastic about business prospects that everyone is convinced the company is going places*.

"Show me the head of a company who is so darned fired up about the potentialities of his business that he misses no opportunity to talk about it, and I take it for granted he has in back of him an organization that is just as fired up as he is. He exudes confidence—so do they!"

But the momentum created by spirited leadership is not yet enough. In order to transmit the elusive element of spiritual motivation into making men *want* to do uncommon things, you will have to get their devoted participation. Therefore the key responsibility of leadership is to achieve the maximum utilization of its greatest asset: the manpower at its disposal. How do you do this?

Fundamentally, once you have the proper capacity and background yourself, you 1) develop clear-cut short and long-range objectives based on thoroughly determined policies, and 2) you provide your people with the optimal atmosphere in which to yield as much as they can offer.

The activity areas involved in manpower management include:

- 1) Assessment of manpower needs and deployment effort;
- 2) Recruitment and selection;
- 3) Induction, training and formal development effort;
- 4) Motivation and compensation;
- 5) Marketing research and studies to keep sales manpower well informed.

### MANAGEMENT PHILOSOPHY

How well these functions are executed depends upon the management philosophy that guides them. And the philosophy should simply be this: make your people understand that you want to obtain their true and full participation. However, you can make them understand this only if you mean it, practice it, and by your very action make plain that you are completely sincere in this. Of course, if you are not, it won't work. The next question then is: how do you practice this philosophy? How do you apply the proper methodology?

The most effective method that has been developed to date is one called "idea engineering." It is based on three principles.

**Principle One.** The cumulative know-how and experience latent in most companies in the fertilizer

industry (elsewhere too, but somewhat more in our industry than in most) is largely unexplored. Yet it is superior in quantity and quality to any "expertness" otherwise accessible to management. Most executives don't come easily by this kind of intellectual democracy! Even managers who regularly involve their personnel in meetings and conventions think they have obtained real participation, when they have used such vehicles as little more than clever devices through which to put their messages across. This isn't nearly good enough because by making full use of the cumulative and latent know-how of the people in your organization, you get a result that is highly superior to that obtained without its full use. Principle One requires a *sincere belief* that this is so!

**Principle Two.** Most employees are skeptical of their company's sincere regard for their ideas and opinions." They vote in their minds for or against management as a whole or for or against a particular member of the management. The more skeptical they are of management's sincere regard for their know-how and opinions, the less they will give of their ideas and candid thinking, all the open-door policies and friendly socializing notwithstanding.

In almost all oral and other direct situations, people will tend to tell what they think is expected of them. Thus they will withhold a great deal, no matter how emphatic they may have been on a given subject, rather than expounding it to their colleagues or families. Hence principle two: only procedures and situations which provide *believable anonymity and an equally believable probability that ideas and opinions will be used*, are capable of pooling the best individual thinking that is available in any group.

**Principle Three.** All individuals, including executives, are generally incapable of properly addressing themselves to an aim. To activate their best thinking requires first a concise statement of the problem and then a development of the underlying difficulties before they can come to grips with most any task! This is nothing new, as every high school graduate realizes that a problem well stated is at least a partial answer unto itself.

To sell more fertilizer at a more equitable profit is not a problem. It is an objective. Hence to find out from your people how the objective can be accomplished, you must first develop and understand the underlying problems, obstacles and difficulties before you can intelligently shape programs and tasks that will lead you toward the objective. Thus, never confront your people—in a sales meeting or otherwise—with an objective. Rather, after establishing the objective, invite them to deal with a *target* that is expressed as a *problem*, and then pool the thinking present and accessible to define and clarify the problem.

Now, should you have made up your mind that putting the three principles of idea engineering into operation will motivate your salesmen to sell more fertilizer at a profit, you still have to work out their precise application. The "how to" of this, based on a wealth of experience gained in actual practice, will be told in a second article on the subject in the August issue. ▲



## MERCHANDISING AIDS PROMOTION

# Basic principles in

# MERCHANDISING F

By F. E. HARTZLER

**M**ERCHANDISING is always the scientific part of selling goods to consumers. As yet the fertilizer industry is not prepared to talk about merchandising. Too much ground needs to be covered. There are too many things that need to be known. But we might start with basic principles.

Merchandising is concerned with the right amount of the right product, at the right time and the right price. These fundamentals never change. The prediction of the market for fertilizer in any community should be reasonably simple. Just take the figures of sales for the last four years and project them for the coming year. If you have the figures for the last four years, you shouldn't have too much of a problem.

However, there is one thing that does need to be watched. Look at the price. Everything that was sold at a markdown or below cost is not a legitimate sale. Chalk it up to experience—admit that you were just good enough as a salesman to sell five dollars for four and resolve not to repeat such a case of poor judgement.

I can show you what this means in terms of profit. A store in my home town used to have wonderful sales the day before Christmas. You could buy merchandise for cost or below. Of course all the people who had paid full price for their Christmas presents resented seeing them put on sale even before Christmas for a third of what they had paid for them, so they learned to wait until the day before Christmas to buy. The sales figure was large; the store took in a lot of money, but it lost a lot of money, too.

### STOCK CONTROL CHANGED THE PICTURE

A stock control system, installed by the store three years ago, has completely changed the picture. A lot of people were disappointed that first year when they could not buy three dollars for one; the sales on the day before Christmas were very low; but the store is far more prosperous today and people are coming in to pay full price for merchandise two or three weeks before Christmas. They know that a

present costing a hundred dollars will still be worth a hundred dollars on that last day.

Control in fertilizer will have a similar effect. As I have explained it is simple once it is installed and in effect: Tell your dealers to count up how much they sold at a profit last year, reorder that plus the natural increase you anticipate.

If this industry could learn one thing, it would do well. There is no crime in running out of merchandise two days before the end of the season. That last five per cent that your dealers have not sold can break the business. In fact running out is sometimes the best thing that you can do; nothing so convinces a customer that he missed a good bet as not being able to get the product. On the other hand, nothing so convinces him that a product is not worth the money he paid for it as seeing his neighbor get a better deal just because he waited another week. He then has a right to his belief that there is no real price on the merchandise, that if he bargains a little he can get it cheaper—that only a chump pays the asking price.

Since the retailer is naturally conservative and wants to buy only what he can sell, but the manufacturer is aggressive and wants to sell all he can, there is room for disagreement. However, it should be possible to work out some sort of consignment arrangement that would relieve the dealers of the problem of having to cut that last five per cent. Perhaps it could be shipped forward to another dealer at cost plus freight. Shorter orders might be the answer—something of this nature is becoming necessary.

Stock control will give the dealer figures on the stock to have on hand, but there are other things he needs to know. Perhaps only an association project could obtain this information: the practices of high profit dealers, the practices of low profit dealers, and, of course, the practices of middle profit dealers; cost figures such as costs per ton, costs on delivery and labor, costs per mile, the mileage limit that a dealer can haul and still make a profit. All these are facts that will make it possible for the dealer to have a going business.

Suppose you as a representative were to call on a

FARM CHEMICALS



# G FERTILIZER

dealer who had asked you for help. You know and I know you can give him the old pep talk, but what sort of help can you really give this man? Does he have a set of books that you can sit down and compare with the nationwide average? Can you clearly point out the break-even points that all businesses tend to fall into? Can you look at the number of acres crops and the kinds of crops and figure roughly what share of this volume he can expect. Can you, as a representative, really point out to him what auxiliary lines he should be carrying in order to build his traffic or to balance his sales and give him enough potential to stay in business? All of these are merchandising problems. All of them demand specific answers based on some evidence. It is not enough to give pep talks. In fact, I once knew some very good merchants who referred to such tactics and the men who used them as the "Keep green and growing boys."

There isn't a dealer alive but knows in his own soul that if he got out and worked he could make money—everybody knows this. The problem is how can he divide his work in order to get the most for his efforts? Do you have a plan that is proven and backed with figures based on experience that he can use and measure the results as he goes along?

There are so many things that should be and have been proven that this industry needs to review and make available to its dealers. Among these are credit promotion and policies, standard credit forms, bookkeeping methods, basic sales training—simple things that are a part of every business. Someone in the fertilizer industry should bring these together.

## Sales Helps

This job of selling to the farmer customer will be easier with helps for the dealer from the industry. One such might be a chart showing production potential or profit potential. Such a chart would be a valuable tool for the dealer. It would permit the farmer to determine quickly the income level he wished to attain, and the amount of fertilization his land would need to reach it. This, together with good simple figures, some well-worked out sales talks, advertising aimed at appealing to the farmer as he is, not the highly educated person he might be, is what the industry must do for its dealers, so that the dealers, in turn, can reach their great market potential—the non-user.

These should not be taken from spectacular experiences—they must be things that work on the average and that can be done by average men in average conditions. Isolated examples make interesting reading but prove nothing. It's the workaday examples that can be put to work that count.

## FIGURES, FACTS AND TOOLS

What you need before you can even talk about merchandising are figures, facts and tools.


*Here is a list of such tools:*

- ▶ A good set of standard books with cost figures
- ▶ Standard credit policies that have worked
- ▶ Sales kits and training courses in how to use them
- ▶ A good simple income predictor for the various levels of fertilizer to make farm planning easy for the dealer and customer
- ▶ Prospecting methods

*Merchandising figures needed are:*

- ▶ Average expenses and sales
- ▶ Break even points
- ▶ Average trade territories in terms of acres and crops
- ▶ Satisfactory auxiliary lines—what they are and how much
- ▶ Monthly sales charts
- ▶ Sales forecasting

Until these facts and tools are gathered talk of merchandising is a waste of time. Merchandising requires figures not fancy. ▲



*Before the fertilizer industry can consider merchandising, it must review the entire relationship between dealer and the industry. This review will be invaluable in establishing the facts and figures that are now available and those which must be gathered to form a proven basis on which to build merchandising policies and practices.*

*TVA Pilot-Plant Demonstration last month  
at Wilson Dam, Alabama, featured a discussion on*

## SOLVING THE NITROGEN LOSS PROBLEM

**A**FTER SEVERAL large-scale continuous ammoniators were in operation, reports began to come in that heavy fuming and high nitrogen losses were encountered in many cases. This was surprising to us for we had not encountered this problem.

The probable cause of this new problem is the lack of any suitable criterion for scaling up the pilot-plant data. Most equipment manufacturers assumed that the capacity of an ammoniator was proportional to its volume. We cannot criticize them for this since we had no better formula to offer.

A 6- by 6-foot ammoniator has eight times the volume of our 3- by 3-foot pilot-plant unit. Since the pilot plant operated satisfactorily at 3 tons per hour, the 6- by 6-foot unit was expected to handle 24 tons per hour. The reaction, however, occurs not throughout the entire volume of the ammoniator, but in the immediate vicinity of the spargers. The length of the spargers of the 6- by 6-foot unit is only about twice the pilot-plant spargers, although they must deliver eight times as much ammonia and acid. Therefore, for each foot of sparger length, four times as much chemical reaction occurs. This can cause local overheating, overgranulation, mud formation, and attendant fuming and nitrogen loss.

A typical pilot-plant acid sparger has an active length of 15 inches with twenty holes spaced  $\frac{3}{4}$  inch apart. When the pilot plant is operated at 3 tons per hour on a formulation using 140 pounds of acid per ton, the amount of acid discharged through each hole is 21 pounds or 1.4 gallons per hour. In large-scale ammoniators the sparger length is increased, but sometimes the spacing of the holes is also increased so that there may be no more holes than in the pilot-plant unit. So we may have as much as 168 pounds or

11 gallons per hour through each hole. This can cause localized spots of high acidity which can cause serious nitrogen loss.

### THE EXTENT OF THE PROBLEM

To obtain some idea of the extent of the nitrogen loss problem, all available reports of state laboratory analyses of fertilizer samples were collected and examined. Averages of thousands of samples showed that the nitrogen content of 10-10-10 and 12-12-12 was consistently low. For instance, in a typical state the average analysis of 12-12-12 was 11.5-12.5-12.5. About half of the samples were deficient in nitrogen to an extent that exceeded the tolerance set by state law.

We have been assured by many manufacturers that the nitrogen input is at least equal to that guaranteed, usually appreciably more than guaranteed. If we assume that the average manufacturer formulates 12-12-12 to contain the same amount of nitrogen,  $P_2O_5$ , and  $K_2O$  and comes out with 11.5-12.5-12.5, then a full unit of nitrogen must have been lost. If the  $P_2O_5$  and  $K_2O$  contents were formulated to be exactly 12 per cent, we must assume that there has been an unanticipated weight loss of about 80 pounds to account for the overage of these elements. It seems evident that the nitrogen loss is not primarily ammonia since ammonia loss would not cause so much weight loss.

The heavy nitrogen loss is an economic loss in several ways: the actual value of the nitrogen lost, the shrinkage in weight of the product, the overage in  $P_2O_5$  and  $K_2O$  for which the manufacturer does not get credit, and the penalties and unfavorable publicity

due to deficiencies found by state laboratories. These economic losses have been estimated to amount to several million dollars per year.

#### STUDIES OF LOSS OF NITROGEN IN 12-12-12

During much of the previous pilot-plant work on the continuous ammoniation process, primary emphasis was placed on the development of workable formulations for most of the popular grades. One of the requirements of a workable formulation was that it should not result in excessive loss of free ammonia. A loss of more than 5 per cent of the free ammonia in the formulation, as determined by analysis of the ammoniator exhaust gas, was considered excessive. Occasionally, tests were made in which the ammoniator exhaust gases were analyzed for other nitrogen compounds such as ammonium chloride and soluble oxides of nitrogen. These tests did not disclose important losses other than the loss of free ammonia. Nitrogen losses determined by material balance occasionally failed to correlate well with the ammonia loss; however, these discrepancies were generally attributed to factors such as segregation, difficulty in sampling, and the short duration of the runs which tended to make the balances less accurate than the gas analysis.

With the increasing number of reports of failure in the commercial units to make grade with respect to nitrogen, it became obvious that losses of nitrogen not detected in the pilot-plant work were involved. Consequently, a series of special tests was made to obtain further information on the loss of nitrogen. The 12-12-12 grade was chosen for this work because, of the more popular grades, it is the one in which highest nitrogen losses are reported. The formulation

used was the standard one used in the majority of plants. It contained 9 units of nitrogen from solution and 3 units from ammonium sulfate. Other materials were ordinary and triple superphosphate, potassium chloride, and sulfuric acid. Following is a discussion of some of the data obtained in the tests.

*Effect of Acid Feed Rate:* In pilot-plant production of 12-12-12 grade at a 2-ton-per-hour rate the amount of sulfuric acid used in the formulation was varied from 75 to 225 pounds per ton of product to study the effect of the acid rate on loss of nitrogen as determined by ammoniator exit gas analysis for ammonia. Ammoniating solution and sulfuric acid were fed through the 30- and 15-inch distributors, respectively. In varying the acid feed rate, the degree of ammoniation of the superphosphates in the formulation was varied from about 40 to 140 per cent of the normal value (3.8 and 5.8 lb. ammonia/unit of available  $P_2O_5$  for triple and ordinary superphosphate, respectively).

Lowest loss (0.7 per cent) was obtained at about 75 per cent of the normal degree of ammoniation (170 lb. sulfuric acid/ton). The loss increased at about equal rates as the degree of ammoniation increased or decreased from the 75 per cent value. At a degree of ammoniation of 40 per cent the loss was 2.7 per cent. At a degree of ammoniation of 110 per cent the loss was 2.4 per cent, and at 140 per cent of normal ammoniation the loss increased to 5.2 per cent. It is believed that at the low degrees of ammoniation the high acid rates caused the increasing losses by raising the temperature of the material and by promoting overagglomeration. Nitrogen losses other than ammonia undoubtedly occurred in these tests, but their measurement was not sufficiently reliable to permit correlation with the acid rate.

We do not wish to infer that these pilot-plant results can be applied directly to large-scale plants. The conditions for minimum nitrogen loss undoubtedly will vary depending on plant equipment, method of operation, and formulations used. However, in large units it is likely that ammonia loss will be increased by increased acid rates at some level of acid addition.

*Effect of Production Rate per Unit Length of Distributor:* It was considered likely that the higher production rate per unit length of ammonia distributor in the large-scale continuous ammoniators might be a cause for at least part of the higher loss of nitrogen reported in large-scale production. Pilot-plant tests were made, therefore, to determine the effect of the production rate per foot of distributor on loss of nitrogen in the ammoniator. The hourly production rate of 12-12-12 and length of distributors were varied to give values of 0.8, 1.2, 1.6, and 2.4 tons per hour per foot of ammoniator distributor. The highest rate is about the same as is commonly used in some large-scale ammoniators for these grades, although higher rates are often encountered. The variations in production rate per unit of distributor length were obtained in the pilot plant by the following combinations of production rate and lengths of distributors.

(Continued on the following page)

## PRODUCTION METHODS

Production rate, <sup>a</sup> tons/hr./ft. of ammonia distributor	Hourly rate of production of 12-12-12	Length of distributor, in.	
		For acid	For solution
0.8	2	15	30
1.2	3	15	30
1.6	2	7.5	15
2.4	3	7.5	15

<sup>a</sup> Rate per foot of acid distributor is twice these values.

In making these tests, special precautions were taken to proportion the ingredients and to obtain representative product samples so that the nitrogen loss could be determined accurately by comparison of the input and output N:P<sub>2</sub>O<sub>5</sub> ratios, as well as by gas analysis.

Data showing the effect of rate of production per foot of distributor on loss of nitrogen as indicated by gas analysis and by N:P<sub>2</sub>O<sub>5</sub> weight ratios of feed materials and ammoniator product are given in Table I. Several interesting things are indicated by these data. The loss of nitrogen as determined by chemical analysis of solutions used to scrub samples of exit gas from the ammoniator (gas analysis) appeared to increase slightly with increased rate per foot of distributor. The loss as determined by N:P<sub>2</sub>O<sub>5</sub> ratios in the feed materials and in the product increased steadily from 1.3 to 4.5 per cent as the unit production rate was increased from 0.8 to 2.4. At the higher rates the loss by N:P<sub>2</sub>O<sub>5</sub> ratio was about twice as great as by gas analysis. This trend had been noticed before in data for other pilot-plant tests.

The most plausible explanation of loss of nitrogen in a form that would not be detected by scrubbing samples of exhaust gas was the decomposition of ammonium nitrate to nitrous oxide or elemental

nitrogen. It is reported in the literature<sup>1</sup> that, in the temperature range 210° to 500° F., 98 per cent of the decomposition of dry ammonium nitrate is decomposed according to the following equation.



Elemental nitrogen also is formed. Ammonium nitrate that contains both chlorides and free nitric acid is reported to undergo serious decomposition upon heating to 295° F. Chlorides also increase the proportion of elemental nitrogen in the products. Consequently, small-scale tests were undertaken to study factors that might cause decomposition of ammonium nitrate under conditions that might prevail in the ammoniators and, if possible, to collect and identify the compounds that make up the unaccountable loss of nitrogen.

Mixtures containing ammonium nitrate were heated in ovens for about an hour, and the loss of nitrogen was determined by analysis of the residue. Exploratory tests indicated that little or no decomposition of ammonium nitrate occurred unless acid or potassium chloride was present. Therefore, sulfuric acid and potassium chloride were usually included in the mixtures used to investigate the effect of acid concentration and temperature on loss of nitrogen.

When a mixture consisting of 40 per cent ammonium nitrate, 40 per cent potassium chloride, and 20 per cent diluted sulfuric acid was heated to about 200° F., the loss of nitrogen increased from 1 to 9 per cent as the acid concentration was increased from 10 to 50 per cent.

Time of the maximum temperature during the hour of heating varied from 12 to 20 minutes. The loss increased from 10 per cent at 195° F. to about 30 per cent at 245° F.

In these tests, less than 5 per cent of the nitrogen evolved was found in an absorption train designed to collect ammonia, ammonium salts, NO, NO<sub>2</sub>, and nitric acid. This lent support to the postulate that the decomposition resulted in the formation of nitrous oxide (N<sub>2</sub>O).

Regarding equipment, the effluent gases are passed through scrubbers containing acid and basic solutions to remove soluble nitrogen compounds and a dry-ice-cooled trap to remove water. Nitrous oxide is removed by cooling below its freezing point under vacuum using liquid nitrogen as the coolant. The nitrous oxide thus collected is revaporized and its volume measured. Also, samples of the revaporized material are analyzed.

When this equipment was used to collect the effluent gas from the laboratory tests described above, as much as 85 per cent of the nitrogen loss could be accounted for. About 4 per cent of that evolved was collected in the scrubbers in the form of soluble nitrogen compounds, and up to 81 per cent was recovered as nitrous oxide.

To date, only a few samples of gas from the pilot-plant runs have been checked for nitrous oxide. When high production rates per unit of distributor

TABLE I

Effect of Production Rate per Foot of Distributor on Loss of Nitrogen

Production rate of 12-12-12, tons/hr./ft. ammonia distributor	Ammoniation rate, % normal	Ammoniator product temperature, °F.	Nitrogen loss as determined by	
			Gas analysis	N:P <sub>2</sub> O <sub>5</sub> ratio
0.8	93	211	1.4	0.4
	93	211	1.5	0.6
	75	228	0.7	0.6
	92	210	0.9	0.8
	110	206	2.2	1.8
	111	206	2.4	1.9
Average 1.2	113	191	1.8	2.9
			1.6	1.3
	92	—	0.9	1.9
	93	—	0.8	1.2
Average 1.6	94	—	0.9	1.7
			0.9	1.6
	59	225	1.5	4.1
	93	210	0.9	2.5
Average 2.4	95	212	1.2	0.7
	98	202	3.3	6.0
			1.7	3.3
	100	212	2.3	4.9
Average	118	193	2.7	4.1
			2.5	4.5

<sup>a</sup>Normal ammoniation rate: 3.8 and 5.8 pounds per unit of P<sub>2</sub>O<sub>5</sub> from triple and ordinary superphosphate, respectively.

<sup>1</sup> Saunders, H. L., *J. Am. Chem. Soc.* 121, 698-711 (1922).



length were used, the nitrous oxide detected amounted to about 20 per cent of the total nitrogen represented by nitrogen compounds detected in the samples. While the amounts collected do not account for all of the hitherto unexplained nitrogen loss, it appears that a substantial portion of the loss involves the decomposition of ammonium nitrate. Further efforts are being made to make the method of detecting nitrous oxide in the pilot-plant gas more quantitative. This work will then be extended to include measurements of decomposition in the dryer.

## CONCLUSIONS AND RECOMMENDATIONS

We believe that the results of our pilot-plant tests on the nitrogen loss problem show that nitrogen is lost from the continuous ammoniator, both as free ammonia and as the decomposition products of ammonium nitrate. The decomposition products contain nitrous oxide and possibly elemental nitrogen and cannot be detected by ordinary gas analysis.

The loss of nitrogen as free ammonia occurs in increasing amounts when the degree of ammoniation is increased much above 5.8 pounds per unit of  $P_2O_5$  from ordinary superphosphate and 3.8 pounds per unit from triple superphosphate. The use of large amounts of sulfuric acid to reduce the degree of ammoniation considerably below these rates is not an effective way to prevent loss of free ammonia.

Our pilot-plant tests show an increase in the loss of free ammonia when the degree of ammoniation was decreased below 75 per cent of its normal value by the addition of acid. This is due presumably to the high temperatures developed and excess agglomeration which made ammoniation less efficient. The adverse effect of increasing acid rates is likely to be accentuated in large scale units where good distribution of liquids is more difficult than it is in the pilot-plant ammoniator. A more effective way to reduce the loss of free ammonia would be to lower the free ammonia content of the formulation.

We believe that conditions favoring serious loss of nitrogen by decomposition of ammonium nitrate are likely to occur in many large-scale ammoniators. Localized areas of high temperatures or high acidity, or both, may result when distribution and mixing of the liquids with the solids are poor or when too much reaction occurs per unit length of distributor. These conditions may not be detectable by measurements made on the ammoniator product. Temperature near the distributors in the pilot-plant ammoniator during production of 12-12-12 has been found to be as high as 260° F., about 30° F. higher than the product temperature. It seems safe to assume that higher localized temperatures are encountered in large-scale units where there is less surface available for heat loss and good distribution is difficult to maintain.

In order to reduce the loss of nitrogen caused by decomposition of ammonium nitrate when making high-nitrogen grades such as 12-12-12, we suggest the following precautions.

- 1) Use distributors that extend throughout the full length of the ammoniator.
- 2) Use distributors designed to give maximum dis-

tribution of liquids. Distributors should be slotted or should contain a large number of small holes rather than a few large ones.

- 3) Distributor and supporting members should be of streamlined design to minimize interference with the rolling action of the bed.
- 4) Formulations and operating conditions should be adjusted to avoid overgranulation to the extent that mixing would be impaired.
- 5) Distributors should be inspected and cleaned frequently. They should be replaced before the openings are enlarged to the extent that the distribution pattern is changed. The acid distributor requires particular attention as it is subject to the worst corrosion. Hastelloy C is a recommended material for acid distributors.
- 6) Formulations giving excessive heat of reaction should be avoided.

We believe that, for new installations, the cost of building longer ammoniators than are in common use would be money well spent. Some of the existing ammoniators may be so short that even with full-length distributors the concentration of heat of reaction is too great. In such cases it may be profitable to install a second set of distributors to utilize the volume of the ammoniator effectively. Another variation that might serve to reduce localized overheating is separation of the solution and acid distributors a short distance in order to permit mixing of the solution with the solids before it reacts with the acid. These variations will be tested in the pilot plant, but tests made in large-scale equipment would be more conclusive.

## DESCRIPTION OF DEMONSTRATION RUN

In the demonstration run, conditions conducive to high loss of nitrogen will be used. The production rate will be 3 tons an hour. Ammoniating solution will be introduced through a short distributor (15 in.) extending only half the length of the ammoniator. The acid will be distributed through a pipe 7.5 inches long, drilled, and containing five  $7/32$ -inch holes. Under these conditions the production rate per unit length of distributor will be relatively high (2.4 tons/hr./ft.), and distribution of acid should be poor. The temperature near the acid distributor and the temperature of the material leaving the ammoniator will be recorded continuously to illustrate the excessive temperature in the hot zone.

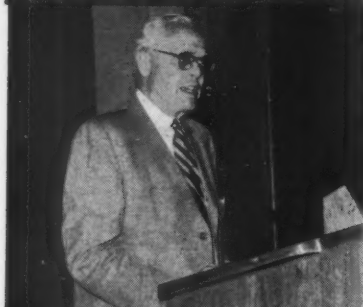
The sampling apparatus for detecting nitrous oxide will be in operation in the pilot-plant area, and recovery of nitrous oxide can be observed. This material is trapped as a white solid at a temperature of about minus 320° F.

The formulation to be used in the pilot-plant run follows.

Raw material	Analysis	Pounds per ton of product
Ammoniating solution <sup>a</sup> .....	41% N	460
Ammonium sulfate	20.7% N	293
Ordinary superphosphate.....	20% $P_2O_5$	515
Concentrated superphosphate..	46% $P_2O_5$	301
Potassium chloride.....	62% $K_2O$	387
Sulfuric acid.....	93% $H_2SO_4$	177

<sup>a</sup> Composition of solution: 22.2 per cent ammonia, 65 per cent ammonium nitrate, and 12.8 per cent water. ▲

## convention business



E. Bennett, outgoing NPFI president, opened the fourth annual convention.



Rep. Jamie Whitten of Mississippi called for a better farm program in his address.



Dr. Richard B. Bahme, Western regional director, gave a progress report.



Sam Tisdale, NPFI, and R. P. Thomas, Int. Minerals & Chem. Corp., studied model of cross sections of a Douglas fir tree, showing effect of fertilizer on tree growth.

## special report

# NPFI PEERS INTO THE

**A** MATHEMATICAL formula for predicting fertilizer use and a little "horse-sense" in adjusting those estimates were presented to NPFI members attending their 4th annual convention at the Greenbrier, White Sulphur Springs, W. Va., June 14-17.

Featured speakers were Rep. Jamie L. Whitten (D-Miss.), chairman of the House Appropriations Subcommittee for Agriculture, and Earl F. Crouse, Farm Business Council, Urbana, Ill.

### NEW 'FORMULA' DEVELOPED

The subject that had members talking all through the sessions was a modern formula for predicting plant food use one year in advance.

Dr. R. A. King, professor of agricultural economics, North Carolina State College, said that when applied to the last 46 years, the formula produced results which closely coincide with consumption.

He presented a progress report on the project, supported by the Institute.

"The State College-developed method, applied to 1957-58, gave a predicted consumption of 6,462,000 tons compared with actual use of 6,358,000 tons," Dr. King stated, adding that "the formula-produced estimate was within 1.6 per cent of the actual consumption."

"The study also has been designed to predict demand for the different major agricultural regions of the country. In its present stage of development the question will not necessarily reflect all the factors that influence fertilizer consumption, particularly in an unusual year."

In commenting on the study, Dr. M. S. Williams, chief agricultural economist of the Institute, pointed out that "the Institute is requesting assistance from market research personnel of member companies in an effort to further refine the technique."

Earl F. Crouse also had something to say about King's formula in his excellent talk, "What's Hap-

pening Down on the Farm."

"Yesterday you heard Dr. King present his formula for predicting fertilizer use. He has, I believe, done an outstanding job. His work can be of great value to all members of the National Plant Food Institute. Dr. King points out, however, that there are some very significant qualitative factors relating to farm trends and farmers' buying habits which are not subject to mathematical analysis."

He stressed King's statement, "Consider the qualifying factors, too. If any of them are, in your judgment, subject to substantial change, take that fact into consideration and use a little 'horse sense' in adjusting your estimates."

### "SLIGHTLY LESS FAVORABLE"

Crouse did not predict a farm recession for 1960—but that "net farm income in 1959 will be only slightly less favorable than in 1958."

"Farming is in the middle of a metamorphic change so great and so far-reaching," he added, "that men with finite vision, such as mine, can only guess at the long range future."

Rep. Jamie Whitten, in his keynote address at the general session on "What's Needed in the Farm Program" said: "... we must amend the present law providing for acreage limitations, correct present faulty administration, and provide the kind of price protection that will permit the farmer to get his fair share of the National income in the market place."

Richard E. Bennett, outgoing president, opened the initial general session.

A panel discussion followed which consisted of Dr. Richard B. Bahme, Western regional director; Zenas Beers, Midwestern regional director; Dr. Samuel L. Tisdale, Southeastern regional director, R. A. King, and Dr. M. S. Williams.

Bahme in "Spreading the Word About Fertilizer" said that one im-

# TO THE 60's

portant objective of the Institute's work should be to create awareness of the importance of fertilizer and to enhance the prestige of the fertilizer industry.

Specific examples of the many projects which are underway in his region are a tour of chemical fertilizer plants by farm magazine and college editors, bankers and college personnel; two farm advisor schools directed at promoting processes, investment costs and products of the industry; special fertilizer issues of Western farm papers; co-sponsorship of banker booklets in California, Arizona and Colorado; presentation of "Colorado Production Achievement Awards"; assistance in conducting the Western Range Fertilization Conference, the California Forest Soils Fertilization Conference, and participation in the "Science in Action" television program entitled "Our Hungry Soil."

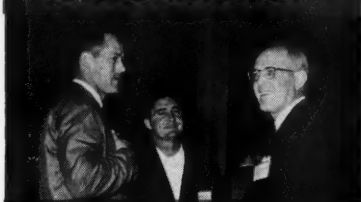
"Zinnie" Bears, in discussing "Raising Farmers' Sights", said that in the Midwest substantial fertilizer use is a relatively new development.

## DEALERS' ATTITUDES VARY

Key point to his talk was the statement that "before farmers will be convinced that they can reach the production capacity of their soils with fertilizer, we must first convince fertilizer dealers and salesmen. Studies have shown that the attitudes of dealers and salesmen vary widely in the same territory. One man will believe that the fertilizer market is 90 per cent saturated while his more successful competitor estimates the same market as 20 per cent saturated. Awareness of opportunity and conviction that it can be reached are the first steps in profit planning for the fertilizer salesman, the dealer, and the fertilizer customer."

Dr. Samuel L. Tisdale discussed "The Intensified Approach to the Fertilizer Market." He said that the key has been found which will open the door to increased and im-

## informal discussion



New NPFI member, Mid-South Chemical Co., Memphis, Tenn. is topic of discussion with D. H. Bradford, Mid-South; D. L. Harrison, DeSoto Chem. & Supply Co., Mesquite, Miss., and J. E. Culpepper, Spencer Chemical Co., Kansas City.



L. W. Gopp, Int. Minerals & Chem. Corp., and George M. Barley, Diamond R. Fertilizer Company, Winter Garden, Florida exchanging notes.



"Monsanto-men" J. P. Glatheer, P. G. Arvan and J. L. Christian relax between NPFI sessions.

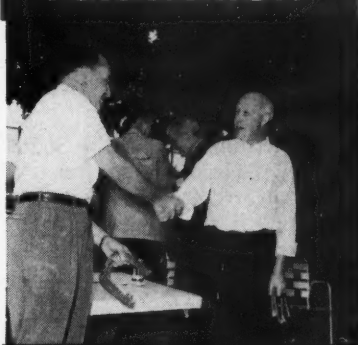


Relaxed is the word for F. L. Litty, Northern Chem. Industries, Inc., Searsport, Me., James E. Tolman, Summers Fertilizer Co., Inc., Baltimore, and Donald Fangmeyer, Northern Chemical.



Thomas E. Ware (right), president of Int. Minerals & Chem. Corp., seems "far from business" with N. C. White, IMC (left), and W. C. Huff, Ashcraft-Wilkinson, Atlanta, Georgia.

## fun and relaxation



Horseshoe doubles winners H. P. Gould, Swift & Company, Bartow, Fla., and T. L. Adcock of Swift's Chicago office congratulate themselves.



Checking horseshoe scoresheet of Frank Seymour, Weil's Fertilizer Works, Goldsboro, N. C. are Joe Prosser, A. J. Sackalt & Sons, Baltimore, and Gordon Cunningham, Tennessee Corp.



"Here's how it's done" seems to be what Ken Jacob (USDA) is saying as he attempts to score against R. P. Thomas, IMC. Also playing are Murry C. McJunkin, U. S. Steel, and H. H. Tucker, Sohio Chemical Company.



Coming long distances were W. G. Hewitt, Bunker Hill Co., San Francisco; R. E. McAllister and Art Wilkinson, Consolidated Min. & Smtg. Co., Canada; and H. Ferguson, Balfour & Guthrie & Company, San Francisco.

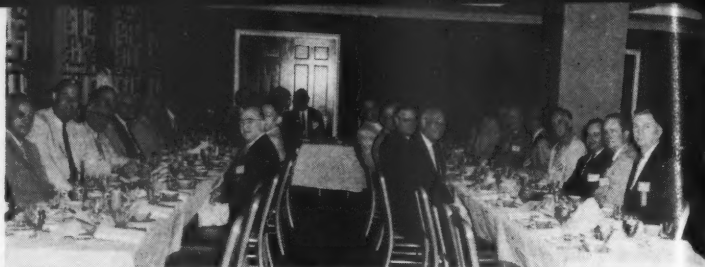


Enjoying complete informality were L. A. Everett, Commercial Solvents; D. W. Laird, Virginia-Carolina Chem. Corp.; C. Marshall, Commercial Solvents and A. P. Gates, V-C.





Annual banquet finds Russell Coleman once again doing the honors.



Breakfast for the Board of Directors is a popular tradition.

proved fertilizer use in the South. The key, he said, is simply that of community organization—getting the people within a county aware of the economic potential which increased and more efficient crop production holds for them.

Dr. L. D. Baver, director, Experiment Station, Hawaiian Sugar Planters' Association, told the convention that the "production of sugar per acre per year is higher in Hawaii than in any other sugar-producing area," and "major factors in the high sugar yields have been the meshing together of the development of new varieties with the intelligent use of fertilizer."

Dr. Baver presented data that showed trends of fertilizer usage in the Islands and its relation to yields, pointing out that with average fertilizer applications (850 pounds of actual plant food per acre). "yields have risen to over five tons of sugar per acre per year (10 tons per crop)."

Speaking on the subject of "Converting Low Value Crops into High Value Crops," Dr. J. Fielding Reed, Southern Manager, American Potash Institute, said that "Fertilizer the Magician can truly work miracles as he changes the low value to the high value crop and makes money appear in your farmers' pockets."

In pointing out that the "lower value" crops (such as pasture and

forage) are greatly under-fertilized, plant food usage on these crops can often be profitably doubled, and net returns from these crops can be increased enormously.

Dr. R. J. Hildreth, research coordinator for West Texas, Texas agricultural experiment station, Lubbock, told NPFI members that "the weather barrier looms much larger to the farmer than the facts justify," emphasizing that "... studies in the more hazardous weather area of Texas tell us that many farmers may have substantially under estimated their chances of fertilizer profit, even if we ignore potential fertilizer carry-over from low moisture years."

#### STEWART HEADS NPFI

J. D. Stewart, Jr., president of Federal Chem. Co., Louisville, Ky., was elected president and Richard E. Bennett, out-going president, was named chairman of the Board of Directors. Bennett, president of Farm Fertilizers, Inc., Omaha, Neb. succeeds L. Dudley George, Richmond Guano Company.

All other Institute officers were re-elected.

Members of the Executive Committee elected by the Board include: Ralph B. Douglass, Smith-Douglass Chemical Co., Inc.; John W. Hall, Potash Company of America; Stanley Learned, Phillips Petroleum Co.; C. T. Prindeville,

Swift & Co.; Justin Potter, Virginia-Carolina Chemical Corp.; W. E. Shelburne, Armour Agricultural Chemical Co., Division of Armour & Co.; Jacob White, Nitrogen Division, Allied Chemical Corp.; Stewart, and Bennett. L. M. Roberts was elected to fill the unexpired term on the Board of Directors of G. R. Monkhouse, both of Shell Chemical Co. The term expires in June 1961.

Twelve new members of the Board of Directors were elected, with their terms expiring in June 1962. They were: B. H. Brewster, Jr., The Baugh & Sons Co.; J. C. Denton, Spencer Chemical Co.; James F. Doetsch, Chilean Nitrate Sales Corp.; Marlin G. Geiger, W. R. Grace & Co.; E. A. Geoghegan, Southern Cotton Oil Division, Wesson Oil & Snowdrift Co., Inc.; L. D. Hand, Pelham Phosphate Co.; E. R. Jones, The Hubbard-Hall Chemical Co.; G. H. Kingsbury, Kingsbury & Co., Inc.; J. J. Lanter, Central Farmers Fertilizer Co.; Tom Wright, Texas Farm Products Co.; Hall, and Prindeville.

Presentation of the "Soil Builders Award for Editors" was made at the annual banquet by Dr. Russell Coleman. Award winners were Eugene Butler, editor-in-chief, The Progressive Farmer, and Bob Christianson, editor, The Arkansas Farmer.

Session break gave E. C. Kapusta, U. S. Potash, div. U. S. Borax & Chem. Corp., and Murry McJunkin, U. S. Steel, a chance to chat, while J. Fielding Reed, American Potash Institute, talked to West Germany Consul General Gustav Schmelz

The Fertilizer Situation may have been the topic discussed by John Mahan, USDA, and Leroy Donald, Monsanto Chemical Co. Right: Gordon Cunningham, Tennessee Corp.; Joe Stough, U. S. Potash Co., div. U. S. Borax & Chem. Corp., and Geo. Klein, Davison Chem. Div. enjoy each other's company.





## MATERIALS HANDLING CUSTOM APPLICATION

# How to Reduce Ammonia Loss During Transfer

A test was recently conducted by the Mississippi agricultural experiment station to determine the amount of ammonia lost filling an applicator tank in a field operation.

Vapor was discharged into a 55-gallon tank filled with water and ice. The ice was used to increase the absorption of ammonia in water. The water tank was tightly closed to prevent evaporation of the ammonia from the water. The applicator tank and water tank were weighed accurately before and after each filling.

The average loss of ammonia while filling a tank with a 10-pound pressure differential was 2.54 per cent. For each filling of a 110-gallon tank (which would contain approximately 465 pounds of ammonia at 85 per cent full) 12 pounds of ammonia or 9.8 pounds of pure nitrogen is lost. Assuming the cost of nitrogen to be 7 cents a pound this would amount to 68 cents lost during each filling.

The loss of ammonia can be held to a minimum by using a hose and fittings with low resistance to the flow of liquid ammonia. Filler valve and the vapor valve should be spaced as far apart as possible on the tank. If they are together, liquid droplets from the incoming ammonia will be carried out by escaping vapor and thereby increase the ammonia loss. In this case, a white vapor can be seen escaping from the vapor valve.

A 10-pound pressure differential between the two tanks was used throughout this test. This is the recommended differential pressure for transferring. However, with a higher differential the losses are much greater.

Tests were conducted in summer and winter. Different atmospheric

By G. BURNS WELCH\*

temperatures seem to have little effect upon the amount of ammonia lost.

A similar test was made to determine ammonia loss while filling an applicator tank with a vapor-operated transfer pump. A small portion of the high pressure ammonia vapor is used to drive the compressor which draws the vapor from the applicator tank and forces it into the storage tank.

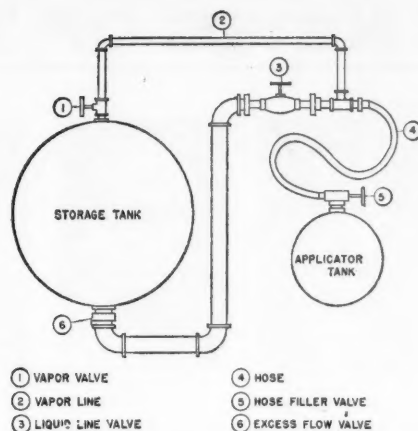
The average loss of ammonia was .405 per cent. This would amount to about 1.9 pounds of ammonia or 1.5 of pure nitrogen lost while filling a 110-gallon tank. Figuring nitrogen at 7 cents a pound, this would amount to 11 cents loss per filling.

Hoses and valves used in both tests had a low resistance to the flow of liquid ammonia.

Based upon these results, the cost of transferring a ton of ammonia by bleeding (10-pound pressure differential) would be \$2.92 while the cost of transferring a ton with a vapor transfer pump would be 47 cents. The use of the pump results in a saving of \$2.45 per ton.

The vapor pump complete with suction hose assembly will cost approximately \$193. By dividing the cost of the pump by the amount saved per ton, it can be seen that at least 79 tons of ammonia would have to be transferred in order to save enough to pay for the cost of the pump.

At the end of a filling operation, there is usually some liquid ammonia trapped in the filler hose and lost to the atmosphere when the hose is disconnected and emptied. This loss can be reduced considerably by the following procedure. A one-half inch pipe is con-



The half inch vapor line at the top of the drawing reduces ammonia loss.

nected from the vapor valve on the storage tank to the inlet end of the filler hose (see drawing). During filling, the valve on the vapor line is kept closed. When the applicator tank is filled, the valve at the end of the liquid line is closed. The vapor valve is then opened and vapor from the storage tank forces the liquid ammonia from the hose into the applicator tank. The vapor is allowed to flow for a few seconds and then the vapor valve and filler valves are closed. The hose can now be disconnected from the applicator tank.

This system is also helpful at times in preventing the excess flow valve in the bottom of the storage tank from closing when the valve at the end of the liquid line is opened suddenly. After the filler hose has been connected to the applicator tank, the valve on the end of the hose is closed. The vapor valve is then opened long enough to equalize the pressure in the filler hose and storage tank. The vapor valve is then closed. When the large valve at the end of the liquid line is opened, there is no sudden rush of liquid ammonia through the line to cause the excess flow valve to close. The filler valve on the hose is then opened to allow the liquid ammonia to flow.

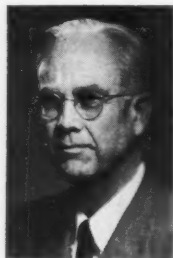
If an excess flow valve should become closed, it can often be opened by closing the filler valve on the hose and opening the vapor valve to equalize the pressure on both sides of the excess flow valve. When this is done, the spring inside the valve has enough strength to open the valve unless it is being held closed by rust or some other foreign material. ▲

\* Associate agricultural engineer with the Experiment Station at Mississippi State University.

# NEWS OF THE INDUSTRY



White



Moyers



Gopp



Stark

## IMC Realigns Product Divisions

International Minerals & Chemical Corp. announced on June 8 a major realignment of its principal product divisions "to capitalize on new opportunities in markets here and abroad."

The change, effective July 1, consolidates three top divisions into a streamlined Agricultural Chemicals Division in which fertilizer materials salesmen will sell IMC's full line. Previously each materials division had a separate sales force.

T. M. Ware, president, said the move meets the needs of changing markets and the customer requirements revealed in a full scale IMC survey of the industry. He said that International expects to gain increased sales, and to improve earnings through cost reductions and better operating efficiencies.

The new Agricultural Chemicals organization combines the Potash and Phosphate Divisions. The Phosphate Division was set up last fall when the phosphate chemicals and phosphate minerals operations were combined as an interim step.

The reorganization plan establishes new responsibilities for two senior IMC vice presidents.

Nelson C. White, vice president of the Potash Division, becomes vice president in charge of long-range planning for agricultural chemicals. George W. Moyers, vice president of the Phosphate Division, becomes vice president and special assistant to the president on agricultural chemicals assignments. He will continue to direct phosphate export sales.

Two new vice presidents in the Agricultural Chemicals Division are Leonard W. Gopp in charge of sales and David J. Stark, operations. Gopp was formerly general sales manager for IMC phosphate

chemicals and Mr. Stark joined IMC from Escambia Chemical Corporation, where he was vice president and production manager.

Three sales departments in the Agricultural Chemicals Division will report to Mr. Gopp. They are the Feed Ingredients Department, headed by John K. Westberg; the Direct Application Rock Phosphate Department, directed by Joseph L. Mealy; and the Basic Materials Department, which consolidates sales of all plant food materials, under E. C. Horne. Mr. Horne came to IMC from Bradley & Baker, where he was general manager in charge of fertilizer sales.

The reorganization puts emphasis on improved technical services and other special customer services by setting up two new departments to handle these functions.

### C. C. ALEXANDER SCHOLARSHIP FUND ESTABLISHED AT PURDUE

Dr. G. R. Ferguson, president of Geigy Agricultural Chemicals, announced last month the establishment of the C. C. Alexander Memorial Scholarship Fund at Purdue University.



Alexander

Class of 1938.

The scholarship, initiated at the suggestion of many of Alexander's friends both within and outside the chemical industry, will be the first

Alexander, who died in an airplane accident on May 12, 1959, was research manager of Geigy Agricultural Chemicals. He was an alumnus of the Purdue Entomology Department,

perpetual fund of its kind at Purdue which will give preference to entomology students.

Contributions may be made directly to the C. C. Alexander Memorial Scholarship Fund, Purdue Alumni Scholarship Foundation, Lafayette, Indiana.

Dr. Ferguson said that Geigy has made a major contribution to the fund in recognition of Alexander's years of service to the company and for his contributions to the field of agriculture as well as to mark their high esteem for him as an individual.

### ARMOUR & CO. BUYS MRF NITROGEN PLANT IN MO.

Armour and Co. has purchased the nitrogen plant of Mississippi River Fuel Corporation near Festus, Missouri, according to a joint announcement. Armour expected to take over the operation of the plant about June 30. They will require all of the plant personnel. They are proceeding with plans to expand the nitrogen facilities.

The plant now produces about 240 tons of anhydrous ammonia a day, part of which is converted into nitric acid and then processed into various ammonia and ammonium nitrate solutions and granulated ammonium nitrate. Armour expects to expand into the direct application of various nitrogen solutions.

At the same time, William Wood Prince, Armour president, announced formation of the Armour Agricultural Chemical Co., as a division of Armour and Co. It will include the Armour fertilizer, nitrogen and phosphate divisions.

Announcement of the purchase follows the statement made by Prince to shareholders at the Armour annual meeting in February that "We must acquire our own production of anhydrous ammonia. This will enable us to enter the growing fertilizer field of direct application and high analysis fertilizers."

W. E. Shelburne, president of the Armour Agricultural Chemical Company, said that a research and development group will be set up to investigate application of various nitrogen solutions. The Festus

plant, opened in 1955, is on the Mississippi river south of St. Louis.

The Armour Agricultural Chemical Company with headquarters in Atlanta, Ga., also operates phosphate mining and processing facilities and fertilizer mixing plants. Mr. Shelburne, a vice president of Armour and Company, has been general manager of the fertilizer division.

#### **I. P. THOMAS DIV. MARKETS DIXCO PESTICIDE LINE**

The I. P. Thomas Div. of Dixon Chemical Industries, Inc., is now marketing under its own "Dixco" label a complete line of pesticides, according to Robert L. McCormick, Dixon's general sales manager.

"This new marketing set-up is another step in our efforts to offer farmers a complete one-stop shopping center for agricultural chemicals," McCormick said. "A farmer can now pick up both his fertilizer and pesticide needs in one trip to our Paulsboro plant."

Dixon is selling with its label Heptachlor, DDT, Dieldrin, Aldrin, Parathion, Malathion, Endrin and Lindane in emulsifiable concentrates and wettable powders.

#### **OLIN MATHIESON REALIGNS INSECTICIDE PRODUCTS DEPT.**

The Insecticide Products Dept. of Olin Mathieson Chemical Corp. has been realigned. Centered around production of basic chemicals, the new program will include the manufacture of technical DDT, DDT compositions, technical Terraclor, Terraclor fungicide compositions, Phytomycin (20 per cent Streptomycin solution), BHC technical, BHC compositions and Omatene fungicide.

K. B. Nash and A. E. Collazo were appointed assistant managers, both reporting to G. D. Baerman, manager of the department.

#### **RUMIANCA (U. S. A.) CHEMICAL CORPORATION FORMED**

Rumianca S.p.A., Italian chemical firm, now is represented in this country and Canada by Rumianca (U. S. A.) Chemical Corp., 375 Park Ave., New York City.

"Expansion of business in the United States, plus ties that Rumianca of Italy has established with several American firms, required

the formation of the new corporation," Dr. Alfonso Liguori, executive vice president of the new company, said.

#### **SMITH-DOUGLASS SALES, PROFITS UP**

Smith-Douglass Co. has reported net sales of \$35,364,539 for the nine months ended April 30, as compared to \$29,796,452 for the same period last year. Net income increased from \$1,246,773 in 1958 to \$2,341,936 for the current year.

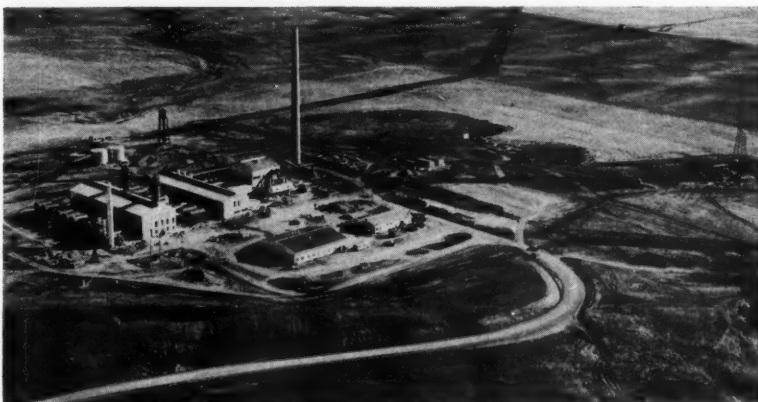
The company also has announced that effective August 1 individual names for its operating divisions will be discontinued. The Smith-Douglass corporate name will be used for the entire company, including San Jacinto Chemical Co. division.

#### **SULFUR EXTRACTION PLANT GOES ON STREAM IN CANADA**

Start-up of a new sour-gas processing and sulfur extraction plant at Okotoks, about 25 miles south of Calgary, was announced June 3 by Texas Gulf Sulphur Co., Devon-Palmer Oils, Ltd. and Shell Oil Co., Canada, Ltd., joint owners of the new plant.

Rated capacity of the new installation, which is being operated by Texas Gulf Sulphur, is 370 long tons of sulfur a day. The gas gathering system, sweetening plant and sulfur conversion units are designed to process 30,000,000 cubic feet of sour gas daily.

Texas Gulf operates Frasch (hot-water) process mines at Fannett, Newgulf, Moss Bluff and Spindletop Domes in Texas, and at Nopalapa Dome in Mexico.



Aerial view of the new sulfur extraction plant at Okotoks, Alberta, Canada.

#### **COLLIER SAFETY NEWS FOR EMPLOYEES, INDUSTRY**

As part of an intensified safety program, Collier Carbon and Chemical Corp. of Los Angeles is now publishing a bulletin, "Safety News." This bulletin, available to Collier personnel at all levels, to other members of the industry, and dealers, is designed to emphasize the importance of preventive measures in minimizing the occurrence of accidents in the fertilizer industry.

The project is under the direction of Jack B. Sturgess, sales engineer in charge of agricultural sales development for Collier. Operating on the principle that "if you discover the hazard, the correction can be found," Sturgess outlines typical accident cases, gives suggestions, specific information, reminders and news of what Collier and other dealers are doing to ensure the safe handling of fertilizers.

The most recent issue of "Safety News" calls attention to the program of Mid Valley Chemical Co., which stresses the value of good attitudes toward safety among workers. This company has set up safety rules, such as the wearing of goggles and possession of "Neutralize" at all times when handling aqua ammonia, which if violated by the employee means dismissal.

#### **CSC DIVIDEND**

A dividend of five cents per share was declared May 25 on outstanding common stock of Commercial Solvents Corp., payable June 30 to stockholders of record at the close of business on June 5.



## NEWS OF THE INDUSTRY

### WINNERS ANNOUNCED IN I. P. THOMAS SLOGAN CONTEST

A ton of fertilizer and two savings bonds have gone to Dixon-I.P. Thomas dealers turning in winning slogans for a company contest.

First prize, a ton of 10-20-20 granular, went to Mrs. B. L. Seem of Emmaus, Pa. Her winning slogan was "Better Farming? It's in the Dixon-Thomas Bag!"

Paul Hewitt, Muncy, Pa., won second prize, a \$50 U. S. savings bond for the slogan, "Dixon-I.P. Thomas . . . Key to More Profit Through Chemicals."

Third prize, a \$25 U. S. savings bond, went to Phil Monfardini of Landisville, N. J. for his slogan, "Don't Be a Doubting Thomas . . . Fertilize with I.P. Thomas."

### OEEC PUBLISHES STUDY ON FERTILIZERS IN EUROPE

"Fertilizers—Production, Consumption, Prices and Trade in Europe" is the title of the eighth report published by the Organisation for European Economic Co-operation on the fertilizer situation in Europe. Covering the years

1956-59, the report summarizes the fertilizer situation in 1957-58 and 1958-59, analyzes the situation for each of the three plant nutrients and for agricultural lime, includes tables on production and production forecasts, imports, exports, consumption and prices for N,  $P_2O_5$  and  $K_2O$ .

The publication is available at \$1.25 from the O. E. E. C. Publications Office, 1346 Connecticut Ave., N. W., Washington 6, D. C.

### LONG TERM GROWTH OUTLOOK SEEN FOR SMITH-DOUGLASS

Harris, Upham & Co., New York investment brokerage firm, in a report released June 2 states that "Smith-Douglass is balancing its seasonal fertilizer business with a growing year-round volume of supplementary animal and poultry feeds. This, plus its development of commercial chemicals, could provide an interesting long-term growth pattern . . ."

The report concludes that "earnings for the fiscal year to end July 31, 1959 are expected to approxi-

mate \$2.25 per share as compared with \$1.46 the previous year. It is generally believed that this current fiscal year will be a more rewarding one in the chemical fertilizer business and that improving profits from the Texas City Chemical plant should further improve the outlook for fiscal 1960 . . ."

### AAC STARTS CONSTRUCTION AT SLEEPY EYE, MINN.

Construction got under way early in June on a new Agrico fertilizer plant at Sleepy Eye, Minn., The American Agricultural Chemical Co. has announced. The plant is being built on a 64-acre site recently purchased by the firm, located six miles east of Sleepy Eye.

First phase of construction is scheduled for completion next fall, according to AAC President C. M. Powell.

### NAUGATUCK INTENSIFIES EDUCATIONAL PROGRAM

U. S. Rubber Co. announced in June that it will step up its program to instruct tobacco growers on correct use of maleic hydrazide, or MH-30.

"Recent debate on the North Carolina State Senate floor, and throughout the state, clearly demonstrated the need for a more intensified educational campaign on the use of MH-30 for sucker control," said Dr. H. Douglas Tate, manager of agricultural chemical research for the company's Naugatuck Chemical division.

"Our program will support the educational efforts of university extension workers, county agents and farm organizations," he added.

Dr. Tate said technical representatives of Naugatuck Chemical will hold meetings for growers at which use of the chemical would be explained.

"We also plan to ask other companies which use our basic chemical compound to formulate MH-30, and firms distributing MH-30, to cooperate in conducting these growers meetings," Dr. Tate said.

"I am sure that when information on the correct use of this chemical is in the hands of all tobacco growers, the problem of misuse—and consequent quality damage—will disappear," he continued.

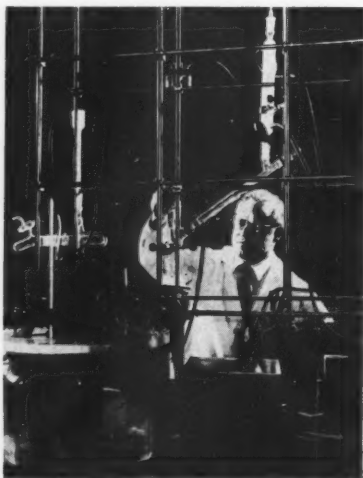
### HOOKER DEDICATES RESEARCH CENTER

On June 2, Hooker Chemical Corp. dedicated its Research Center at Grand Island, N. Y., to R. Lindley Murray, board chairman and former president. Governor Nelson A. Rockefeller was key speaker at the formal ceremonies.

The \$3.6 million research center

comprises about 70,000 sq. ft. of floor space. Twenty-two laboratories occupy two floors and are of modular design. Among general facilities are reception foyer and library with more than 10,000 scientific publications.

Night view of front entrance of the research center. At left, executive offices downstairs and laboratory upstairs. At right, Product Development offices downstairs, Research Library upstairs.



Lewis E. Tufts, supervisor—physical chemistry research, uses special apparatus to determine molecular weight in order to prove the structure of a new chemical compound.



## DUPONT FORMS NEW DEPT. FOR FARM CHEMICALS

Formation of a new department in DuPont Co. is expected to consolidate and strengthen research, manufacturing and marketing of a wide range of agricultural products, that company reports. To be known as the Industrial and Biochemicals Department, it will encompass all of the biochemicals operations of the former Grasselli Chemicals Dept., plus the farm chemicals program of the Polychemicals Dept. Also combined will be the industrial chemicals operations formerly handled by Grasselli and the industrial chemicals and anti-freeze product groups previously handled by the Polychemicals Dept.

Clark W. Davis, general manager of the former Grasselli Chemicals Dept., will be general manager of the new department.

Among the products now consolidated in the one department are urea feed and fertilizer compositions, insecticides, fungicides, herbicides, soil fumigants, turf fungicides, Uramite fertilizer, and seed disinfectants.

## FERTILIZER USE GAINS IN MINNESOTA

Minnesota farmers in 1958 used 14 per cent more fertilizer than they did a year earlier. According to W. P. Martin, head of the soils department at the University of Minnesota, fertilizer use in 1958 totalled almost a half-million tons. That was a whopping 25 times more than that applied in 1940.

Despite the apparent boom in fertilizer sales, hardly more than half of all Gopher state farmers are using any fertilizer at all. And for the state as a whole, Martin says plant nutrients are still being used up at a faster rate than what is being returned in fertilizer form.

## APPLICATOR DESIGNED FOR DRI-DIE INSECTICIDE 67

A hand applicator for use with Dri-Die Insecticide 67, the new treated silica gel powder, has been designed by W. R. Grace & Co. Davison Chemical Div.

The device consists of a polyethylene container to which two attachments can be fitted. One is a long nozzle to blow the powder

into spaces where general distribution is desirable and not objectionable. The other is a spreading device which will roll the insecticide on a strip of surface accessible to the insects but which will avoid general dusting through the atmosphere.

## HARRIS LABS ACQUIRES KANSAS CITY FIRM

Acquisition of equipment and facilities of Soil Consultants Bureau, Kansas City Testing Laboratories was announced recently by Harris Laboratories.

Lewis F. Harris, president of Harris Labs, said that physical equipment of the Kansas City firm was being moved to their Lexington Laboratories Div. at Lexington, Neb.

## HOOKEE ESTABLISHES LONDON OFFICE

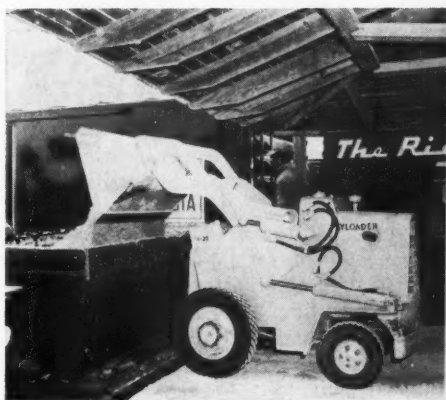
An office has been opened by Hooker Chemical Corp. at 16 Stratton St., London W. 1 as a base for liaison between the American firm and European companies. Dr. Basil V. de G. Walden is Hooker's chief European representative.

Hooker's representatives primarily will contact European research and development organizations and industrial firms. Their four main objectives are to keep abreast of chemical and plastics research and development in Europe; to seek new products and processes for utilization in the U. S.; to investigate possible joint ventures in Europe and in the U. S.; and to assist in bringing to Europe new developments pioneered by Hooker and making them available for foreign use.

## TWO AWARDS TO IMC FOR SKOKIE CENTER

International Minerals & Chemical Corp.'s new Administrative and Research Center in Skokie, Ill. has received two of the nation's top 1959 honors for new buildings.

It was the only office building chosen for a top award in the annual competition sponsored by the Chicago Chapter of the American Institute of Architects in cooperation with the Chicago Association of Commerce and Industry and it was one of two "merit of award"



Evans, Reed & Williams Co. at Sylvania, Ga., produces about 8,000 to 10,000 tons of fertilizer annually, serving an area within 30 miles of the company's plant. Unloading railroad cars, rehandling, bagging and loading out bulk materials is accomplished by using a Model H-25 Payloader tractor-shovel. The company also operates an HAH Payloader.

winners in the nation-wide contest sponsored by OFFICE MANAGEMENT magazine for offices housing more than 300 persons. Tying with IMC for this second place award was Eastman Kodak. Top honor went to the Seagram Building in New York City.

## SIGNAL OIL TO BUY EASTERN STATES P&C

Acquisition of Eastern States Petroleum & Chemical Corp. by Signal Oil & Gas Co. is reported to be underway. The merger agreement calls for an exchange of stock.

## DAVISON INSTALLS CONTINUOUS PROCESS SUPERPHOSPHATE EQUIPT.

Equipment for continuous production of superphosphate at a rate of 100 tons per hour has been installed by W. R. Grace & Co. Davison Chemical Div. in its Curtis Bay Works at Baltimore.

The new "Super Flo" installation, designed by A. J. Sackett and Sons Co., replaces six batch-type units in the "largest superphosphate plant under one roof in the world."

In the process, ground phosphate rock regulated by weight belt and sulfuric acid measured by magnetic flow meter are delivered to one end of the continuous system and partly cured superphosphate, discharged from the other end, is conveyed to storage.

## NEWS OF THE INDUSTRY

### Associations Meetings

#### CLEARING HOUSE FOR DATA ON SOUTHERN FORESTRY

Establishment of a clearing house of information on nutrition and fertilization of southern forests by the National Plant Food Institute in cooperation with the National Joint Committee on Fertilizer Application has been announced by Dr. Laurence C. Walker, Southeastern regional forester for the Institute.

This information center will receive details of experiments for subsequent distribution to interested persons. To receive these periodic releases, those on the mailing list are obligated to submit information relative to their own work on nutrition and fertilization.

Dr. Walker is soliciting participants and requesting brief summaries of research underway, including personnel, organization, location and experimental description. Tentative conclusions are not desirable, he said, but final results are. The first mailing to cooperators is expected by mid-summer.

Persons who wish to be included

on the mailing list may address the Southeastern regional forester, National Plant Food Institute, 190 Hardin Drive, Athens, Ga.

Should response to this south-wide program be favorable, the Institute and NJCFA plan to expand the scope to include all of the United States and Canada.

#### ENTHUSIASTIC SUPPORT FOR 'AGRONOMIC PROBLEM TOUR'

There should be more of them, agreed the college and industry technical people who attended the "Agronomic Problem Tour" in Washington May 7 and 8.

The group which went on the Agronomy and Outlying Testing Tour in Skagit and Whatcom County was composed only of technical personnel from college and industry. Experiment station superintendents, extension specialists, industry agronomists and county agents discussed with enthusiasm the possible solution to the areas difficulties.

One of the major stops on the tour was at the College Outlying Test Plots which are supported in part by a grant from the National Plant Food Institute. These demonstrations consisted of detailed,

randomized hay and pasture fertility plots.

"A major problem encountered on these plots," Darrell Turner pointed out, "is to maintain a proper balance between Ladino clover and orchard grass. The dry spring and summer of 1957 all but eliminated the Ladino, and consequently our major fertilizer response is to nitrogen."

Turner added that keeping Ladino clover in irrigated pastures was not a simple problem and they had the same difficulties in other areas on irrigated pastures.

"Unbalanced fertilizer, low soil temperatures, lack of soil aeration, grass competition, low soil moisture and other factors cause Ladino to disappear from many pastures before it should," Turner added.

The group also looked at a "problem alfalfa field" and examined some Northwest strawberry plantings.

#### DATES SET FOR ALABAMA FERTILIZER INDUSTRY CONF.

The annual Alabama Fertilizer Conference for members of the fertilizer industry will be held Aug. 18 and 19 at the Alabama Polytechnic Institute, according to an announcement by Dr. Howard T. Rogers, head, agronomy and soils department.

Dr. Rogers said the program will include tours to observe results of research on lime and fertilizer use at three outlying units of the experiment station system. Also scheduled is a tour of the TVA facilities at Wilson Dam where research is in progress on new fertilizer materials and manufacturing processes.

In addition to the tours, experiment station staff members will report on several aspects of fertilizer use that will be of particular interest to industry representatives, Dr. Rogers said. Included will be such topics as fate of applied nitrogen, factors controlling efficient use of fertilizer, are soil test recommendations adequate for better farmers, and changes in farm practices.

The conference is sponsored by the API Agricultural Experiment Station and Extension Service in cooperation with the Alabama Soil Fertility Society.



The relation of soil testing to fertilizer responses obtained on Washington Outlying Testing Plots is discussed by Darrell Turner (left), extension soils specialist; Trevor Steele, American Potash and Chemical Co.; LeVern Freimann, Whatcom County Extension Agent; and Dale Massie, Cominco Products, Inc. The plots are supported in part by a NPFI grant.

## ACCIDENT PREVENTION SCHOOL SCHEDULED FOR AUG.

Fertilizer companies doing business in the Midwest have been invited to send their plant supervisory personnel to an accident prevention school scheduled for Aug. 18-19 at the National Safety Council's Chicago headquarters.

The two-day program, sponsored by the NSC Fertilizer Section, headed by George L. Pelton, Smith Agricultural Chemical Co., in cooperation with the National Plant Food Institute, will cover many phases of safety education, methods of cutting accident rates and reducing costs.

Chairman of the school is John E. Smith, Spencer Chemical Co.; co-chairman, Roger Hugg, International Minerals & Chemical Corp.

The program will include classes, discussion periods and group participation sessions. Among subjects will be "Fundamentals of Accident Prevention," "The Foreman's Safety Job," "Personal Factors in Safety," "Solving Safety Problems," "Discovering Accident Hazards," "Safe Handling of Materials in the Fertilizer Industry," "Teaching Job Skills," "Good Housekeeping in Fertilizer Plants," "Safety Service Available," "Safe Handling of Liquid Materials," and "Safe Handling of Insecticides."

Covered in the registration fee will be a set of instruction manuals for each man attending the school. It includes safety supervisor's manual, instructional guides, posters, educational literature and other safety aids.

The Midwest safety school is one of five being set up in various areas of the country. Opening the series will be the Northeastern regional school at Cornell University, Ithaca, New York, Aug. 11-12.

## CFA MOVES TO SACRAMENTO

Office of the California Fertilizer Association was moved on June 1 from San Marino to Sacramento. Sidney H. Bierly, general manager, reports that "it was felt that the staff could better serve the industry from Sacramento, which is the headquarters of the Bureau of Chemistry and of Weights and Measures, and is a short twenty miles from the principal campus of

the University College of Agriculture at Davis."

New address is Room 213, Ochsen Building, 719 "K" Street, Sacramento, Calif. Phone: Hlck-ory 4-7625.

## BOYD WINS NPFI AWARD

The 1959 recipient of the Agronomy Achievement Award at North Carolina State College was Edgar L. Boyd who was selected as the outstanding junior in agronomy. Sponsored by the National Plant Food Institute, the award includes a cash grant of \$200 an engraved key and a plaque which is retained by the college.

He also has received a scholarship awarded by Smith-Douglass Co., Norfolk, Va.

## CHEMICAL EXPOSITION TO BE HELD IN NEW YORK

More than 450 manufacturers have already engaged space for displays at the 27th Exposition of Chemical Industries to be held at the New York Coliseum, Nov. 30-Dec. 4, according to a recent release.

Displays will include chemical processing equipment, chemical materials, and the metals, plastics and other substances employed in mechanical construction.

## PROGRESS REPORT ON SOIL FERTILITY PROGRAMS

Georgia's soil fertility program, operating in 31 counties, continues to grow in magnitude and accomplishment, according to agronomists leading the program for the Agricultural Extension Service, University of Georgia College of Agriculture.

"Nitrogen consumption has greatly increased as a result of the program," says Dr. R. L. Wehunt, extension agronomist. Estimated tons of actual nitrogen used for top and side dressing purposes increased from 40,282 in 1956 to 60,265 in 1958—a gain of nearly 50 per cent in three years.

The Alabama soil fertility program launched earlier this year by the Alabama Agricultural Extension Service is moving ahead at full steam, according to J. C. Lowery, extension agronomist.

The soil testing laboratory has analyzed over 14,500 samples since January—over twice the number handled by the laboratory during the entire year of 1958.

Active support by the Michigan fertilizer industry can help speed the success of the Ionia county intensified soil testing and fertility program, reports County Agent

## Calendar

**July 7-9.** Regional Fertilizer Conference, sponsored by the Pacific Northwest Plant Food Assn. and the section's state colleges and universities, Winthrop Hotel, Tacoma, Wash.  
**July 15-17.** Southwestern Fertilizer Conference Galvez Hotel, Galveston, Tex.

**July 29.** Annual Kentucky Fertilizer Conference, Guignol Theater, University of Kentucky campus, Lexington.  
**July 31.** Agronomy Field Day, University of California, Davis campus, Calif.

**Aug. 3-7.** Gordon Research Conference on Biochemistry and Agriculture, Kimball Union Academy, Meridian, N. H.

**Aug. 18-19.** Alabama Fertilizer Conference, Alabama Polytechnic Institute, Auburn.

**Aug. 18-22.** Canadian Fertilizer Assn. Annual Convention, Bigwin Inn, Lake of Bays, Ontario.

**Sept. 20-23.** Canadian Agricultural Chemicals Assn. 7th Annual Meeting, Chateau Frontenac, Quebec City, Que.

**Sept. 24-25.** Annual Northeastern Fertilizer Conference, NPFI, Bilt-

more Hotel, New York City.

**Sept. 30-Oct. 1.** Fourth Southeastern Fertilizer Conference, Atlanta Biltmore Hotel, Atlanta, Ga.

**Oct. 13-14.** Western Agricultural Chemicals Assn. Fall Meeting, Villa Hotel, San Mateo, Calif.

**Oct. 14-16.** Pacific Northwest Plant Food Assn. Annual Convention, Chinook Hotel, Yakima, Wash.

**Oct. 21-23.** National Agricultural Chemicals Assn. 26th Annual Meeting, French Lick-Sheraton Hotel, French Lick, Ind.

**Nov. 4-6.** Fertilizer Industry Round Table, Mayflower Hotel, Washington, D. C.

**Nov. 9-11.** California Fertilizer Assn. Annual Convention, Fairmont Hotel, San Francisco, Calif.

**Nov. 16-20.** National Aviation Trades Assn. Annual Convention, New Orleans, La.

**Dec. 7-10.** North Central Weed Control Conference, Royal Alexandra Hotel, Winnipeg, Manitoba.

**Jan. 6-8.** Fourteenth Annual Northeastern Weed Control Conference, Hotel New Yorker, New York City.



## NEWS OF THE INDUSTRY

Fred Peabody. The program was launched with a kick-off dinner for county Extension leaders, bankers, merchants and civic organization representatives May 28 in Ionia.

Beginning June 4, a series of monthly dinner meetings was scheduled for fertilizer dealers and salesmen to inform them of the program's progress, seek their advice and suggestions about promotional activities and help them understand soil test reports and fertilizer recommendations. Top dressing established hay fields is the first project following soil tests.

The intensified soil testing program in Guernsey county, Ohio has been a "very successful program from all standpoints" says Oscar E. Share, county extension director. Lime and fertilizer dealers there have been reporting considerable increases in sales this spring "which we are certain are due to the . . . program," he said.

"More than twice as many soil tests were made during the campaign's first three weeks as are usually made in an entire year in the county," according to Share.

### MICH. CROPS-SOILS FIELD DAY: JULY 9

Crops and soils research at Michigan State University goes on its annual display July 9 at Crops-Soils Field Day. Starting time for tours of the various research plots is 9:30 a.m. on the crops and soils research farms at East Lansing.

Among the features expected to be part of the tours are fertilizer placement, Hessian fly control with chemicals, soil sampling techniques; in addition, visitors can see weed control in alfalfa and clover, soybeans, corn and field beans.

### NFSA TO CONVENE IN ST. LOUIS, NOV. 8-10

Executive Secretary Muriel F. Collie reports that the 1959 convention of the National Fertilizer Solutions Association will be held Nov. 8-10 at the Statler Hilton Hotel, St. Louis, Mo.

"Today and Five Years from Today" is the general theme for the convention. John L. Wilson, Semo Liquid Fertilizers, Inc., is general chairman of the convention planning committee.

## People

**The American Agricultural Chemical Co.** Dr. Donald P. Satchell replaces O. C. Leetun as manager of agronomic services. Leetun, who has been with Agrico for 40 years, will remain active in an advisory capacity. Dr. Satch-



Satchell



Leetun

ell, who joined the company in February of this year, had been on the agronomic research staff of Pennsylvania State University since 1951.

Two additional regional sales divisions have been established:

Mid-West, with J. D. McMurray as division manager. He will be located in Cleveland, Ohio.

South Central Sales Div. is new name for the Knoxville Div. B. E. Brown, with headquarters in Knoxville, Tenn., is manager.

**American Cyanamid Co., Agricultural Div.** Dr. Thomas H. Jukes has resigned his post as director of research and accepted the position of vice-president in charge of research for Nutralite Products, Inc., Buena Park, Calif.

**Columbia-Southern Chemical Corp.** Dwight R. Means (right) president and chief executive officer of Pittsburgh Plate Glass International, S. A., receives congratulations from E. T. As-



Asplundh

Means

plundh, chairman of the board of Pittsburgh Plate, upon completing "35 years of distinguished service" with Columbia-Southern. He was presented with a diamond-studded service award lapel pin.

**Commercial Solvents Corp.** Vice President W. Ward Jackson was honored recently by the U. S. Army Chemical Corps in ceremonies at the Army Chemical Center, Edgewood, Md. Jackson was given a plaque and certificate of achievement for outstanding contributions to the Army Chemical Corps. He was honored for "his energetic support of the Chemical Corps' Industrial Liaison program." Major General Marshall



Jackson

Gen. Stubbs

Stubbs, Army Chief Chemical Officer, presented the award.

**Diamond Alkali Co.** Promotion of George W. Hottel, field salesman in Diamond Alkali Co.'s New York branch sales office, to staff assistant in the General Sales and Market Planning Dept., Cleveland, has been announced by H. B. Clark. Transferring to the post vacated by Hottel is Jack G. Redmond, field salesman at Diamond's Cincinnati branch sales office.

**Eastman Chemical Products, Inc.** William W. Isbell has been appointed to represent the Chemicals Div. in the New York area.

**General Chemical Div., Allied Chemical Corp.** has increased its agricultural chemicals staff with the addition of five new men assigned as resident salesmen in various parts of the country.

Walter P. Kerr will be assigned to the St. Louis office and serve as resident representative in Omaha, Nebr.; John Magliocco is assigned



to New York City office and will cover Long Island, northern New Jersey and eastern New York; William D. Thomas is assigned to Shreveport, La., to serve northern and central La. and northeast Tex.; Rogn M. Burnett, assigned to Houston, Tex., office serving all the rest of Tex.; and F. H. Stillwagen, assigned to South Bend, Ind., covering Ind. and Ky.

**International Minerals & Chemical Corp.** Frederick Koechlein (left), general manager of the Phosphate Div., receives 30 year employment pin from George Moyers, division vice president, at ceremony in IMC's Skokie, Ill., headquarters. Koechlein, a graduate of Rutgers University, joined



Koechlein

Moyers

IMC as assistant production manager of the division May 1, 1929.

**Olin Mathieson Chemical Corp.** Henry H. Hunter has been appointed director of communications. He had been director of public relations. In the newly created position, Hunter will supervise advertising, public relations and stockholder relations for the corporation and its divisions.

**Spencer Chemical Co.** New

assignments in the Agricultural Chemicals Div.: Byron M. Kern, general manager of production, will assume duties of general sales manager. Harold E. Bingham, general sales manager, will take control of the development of new products, with the assistance of Harold Ihde, director of marketing. Jack E. Straub, assistant to the vice president, will coordinate production activities in the office of the general manager of production.

**Texaco Inc.** has announced appointment of Allen F. Dow as petrochemical sales supervisor for the Midwest, with headquarters in the McCormick Building, Chicago. Dow will supervise the marketing of nitrogen products, solvents, chemical intermediates and corrosion inhibitors manufactured by Texaco.

Charles B. Fischer has been named Texaco's petrochemical sales representative to fertilizer manufacturers and other users of ammonia and nitrogen solutions in Indiana, Michigan, Ohio and Kentucky.

## Chemicals

### MORE EFFECTS OF GIBBERELIC ACID NOTED

Two more effects of gibberellic acid on plants have been noted by scientists at the University of Minnesota. They have found that the chemical—known to stimulate growth—causes a plant both to take up more phosphorus and to lose water more rapidly.

The findings come from botanists

A. J. Linck and T. W. Sudia. In one test they put bean plant roots in gibberellic acid solutions, added radioactive phosphorus (P-32) and checked plants 28, 52 and 76 hours later with a Geiger counter.

In all cases, plants treated with the chemical had absorbed more phosphorus than non-treated ones. Gibberellic acid also affected the phosphorus distribution; after 76 hours, for example, upper stems of treated plants had four times as much phosphorus as non-treated ones. In new leaves, though, gibberellic acid only doubled the amount of phosphorus.

Just how these findings may be used in the future is still a question. Linck and Sudia say it would take many more tests to tell whether gibberellic acid can be used to speed up fertilizer use.

### TRITHION GRANTED ADDITIONAL TOLERANCES

Four additional crop tolerances have been granted by the U. S. Food and Drug Administration which broaden the potential use of Trithion, the insecticide-miticide developed by Stauffer Chemical Co. The recently issued tolerances include:

Undelinted cotton seed (0.2 ppm); onion (green or dry bulb) (0.8 ppm); cucumbers and summer squash (0.8 ppm); figs (0.8 ppm).

As a result of the new regulations, Trithion may now be used on cotton up to harvest time, and on cucumbers, summer squash and figs up to 7 days of harvesting. Tolerances have previously been established for Trithion on some 33 crops.

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## NEWS OF THE INDUSTRY

### FERTILIZATION RESEARCH ON LOBLOLLY PINE SEEDLINGS

Louisiana State University Research workers recently completed initial treatments on 22 acres of Loblolly pine seedlings in new fertilization research projects at the North Hill Farm Experiment Station, Homer. Dawson Johns, station superintendent, said that primary objectives of the studies include

- 1) determination of levels and combinations of nitrogen, phosphorus and potash that will bring about greatest growth response of Loblolly pine on major North Louisiana Coastal Plain soils, and

- 2) attempt to establish a basis for estimating nutritional requirements through soil and plant analysis.

Related fertility studies with Loblolly pine are planned for other areas in the state. Treatments include different levels of N,  $P_2O_5$ , and  $K_2O$  ranging from 0 to 200 lbs. nutrient per acre. Some treatments were applied just before planting, others a few months after planting, and supplemental applications will be made on certain plots in future years.

Soil samples were collected from different depths on each plot for complete chemical analyses. Each plot contains 66 seedlings, and annual measurements will include height, diameter and chemical an-

alyses of foliage and stems. Wood density determinations will be made after the third growing season. Research project workers include Thomas Hansbrough and R. G. Merrifield, research foresters, and C. R. Carter, agronomist.

### ON THE VALUE OF COTTON INSECT CONTROL

Cooperative studies between USDA and the Texas Experiment Station over the past 20 years to combat cotton insects show that although the percentage of production increased varies somewhat with the use of insecticides, more cotton has always been produced from plots treated with insecticides.

Field trials at Waco, Tex., show an average annual seed-cotton yield of 1,049 pounds per acre from treated plots. This, the researchers say, is 309 pounds, or 42 per cent, more cotton than the average annual total produced on untreated plots.

The experiments further show that since modern organic insecticides have been used to control cotton pests, yield gains have averaged 53 per cent.

### NEW RECOMMENDATIONS FOR RONNEL INSECTICIDE

Ronnel, an organic phosphorus chemical, has been added to the list of insecticides recommended by USDA for control of several livestock pests. Chemical name of the

active ingredient is O, O-dimethyl 0-2, 4, 5-trichlorophenyl phosphorothioate. Korlan is the name applied to the technical grade of ronnel.

Used as a spray, ronnel may be applied to beef cattle for control of horn flies, lice, ticks and screwworms, and to sheep and goats for control of lice, keds, screwworms and fleeceworms, said USDA. It is also effective against lice on swine. Recommended spray strengths are 0.75 per cent for beef cattle and 0.5 per cent for sheep, goats and hogs.

### SKI SLOPE NEWCOMER: AMMONIUM NITRATE

"Ammonium nitrate, that ally of the working farmer, has become the darling of the fun-loving skier," the Kansas City, Mo. *Cooperative Consumer* reports.

"When the fertilizer is spread on sun-softened snow, it absorbs moisture. Within about 15 minutes, a hard, granular surface forms on ski slopes. Some Canadian resort operators report that ammonium nitrate may prolong the skiing season for as long as two or three weeks."

And of course, there's an extra benefit, the report continues. "When the snow finally does melt, the plant nutrient remains to strengthen grass growth and provide a better cover to hold the next winter's snow."

### HIGH N FERTILIZER HELPS CONTROL POTATO SCAB

Use of fertilizer with a high level of nitrogen appears to be a good way to control potato scab, according to research at the North Dakota Experiment Station.

Based on their research, the North Dakota researchers recommend 400 pounds of 16-16-18 per acre. Application at this rate, they say, will not only produce more scab-free potatoes, but it will result in higher yields.

### NEW LABEL CLEARANCE FOR TOXAPHENE

A label clearance by USDA allows application of toxaphene to land being grazed by meat animals and also permits animals to be treated with toxaphene formulations for control of ticks, lice, flies, and other destructive pests, Hercules Powder Co. has announced.



D. R. Carter, agronomist; R. G. Merrifield, forester; and Dawson Johns, superintendent, Homer La. Experiment Station, with tractor mounted circular cultivating tool developed for Loblolly Pine seedling fertilizer studies.

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## Chemicals

### 203—SOLUTIONS MANUAL

A new manual on ammonia and nitrogen solutions is available from Texaco, Inc., as long as their supply lasts. A handy source of valuable information, it includes sections on mixed fertilizer manufacturing processes, safety, agricultural and industrial uses of ammonia. In addition, there are tables and charts showing specifications of Texaco anhydrous and aqua ammonia and nitrogen solutions; vapor pressure; properties; hygroscopicity and solubility of common fertilizer materials; comparative advantages of pug-mill vs. granulating drum mixer; data on sulfuric acid and phosphoric acid; and many others. To obtain your copy,

CIRCLE 203 ON SERVICE CARD

### 204—FAIRFIELD FOLDER FOR FORMULATORS

Formulations aimed at increasing effectiveness of household, garden and truck crop insecticides against resistant insects are offered in a new free folder, "House & Garden Sprays & Dusts" prepared by Fairfield Chemicals, Food Machinery and Chemical Corp. Especially prepared for the insecticide formulator and packager, the folder lists suggested formulations for dual purpose home and garden sprays, horticultural sprays, fungicide additives, emulsifiable garden sprays and concentrates, and garden and truck crop dusts. Key to effectiveness of the formulations listed is Pyrenone, a combination of pyrethrins and piperonyl butoxide, Fairfield reports. Copies of the folder can be obtained by

CIRCLING 204 ON SERVICE CARD

### 205—FRUIT SPRAY CHART

A convenient chart which outlines recommended procedures for the control of a number of deciduous fruit tree insect and mite pests has just been published by Stauffer Chemical Co. Major emphasis is on dosage recommendations of Trithion for delayed dormant, dormant and summer sprays and for post-harvest application to deciduous fruit. Crops include apples, crab apples, pears, cherries, plums, peaches and grapes. Copies are available without charge by

CIRCLING 205 ON SERVICE CARD

### 206—CALCIUM ARSENATE GRANULAR

General Chemical Div., Allied Chemical Corp. has available granular calcium arsenate for formulating and packaging pre-emergence crabgrass control products. The material is reported to be effective for killing germinating crabgrass seeds and

seedlings and also for control of *Poa annua* (annual bluegrass) and chickweed. For complete information

CIRCLE 206 ON SERVICE CARD

### 207—TERRACLOR GUIDE

A new Terraclor application guide for beans giving detailed information on the effective use of this soil fungicide is being distributed by Olin Mathieson Chemical Corp. The illustrated four-page guide is a compilation of work by OM fieldmen, federal and state research personnel and growers who have used Terraclor to control both Root and Stem Rot and White Mold. For your copy,

CIRCLE 207 ON SERVICE CARD

### 208—SEVIN ON FRUIT

Two new folders which describe use of Sevin insecticide on fruit are now available from Union Carbide Chemicals Co., Div. of Union Carbide Corp. One folder gives details about application of Sevin on apples, pears and peaches, and the other one covers grapes. Advantages, application rates and directions are included. If you'd like to have the two folders,

CIRCLE 208 ON SERVICE CARD

## Process Equipment

### 209—NEW PLIBRICO CATALOG

"Plibrico Refractory Products for Calcining, Drying and Processing Furnaces" is the title of a new, fully illustrated 24-page catalog from Plibrico Co. It contains sections on tail rings, furnace doors, clinker coolers, dust chambers, waste heat boilers, stacks, breechings, dryer furnaces and gypsum kettles. Among the installations pictured are Plibrico-lined dryer furnaces of a phosphate processor and granulated fertilizer producer. A copy will be yours if you

CIRCLE 209 ON SERVICE CARD

### 210—DODGE OFFERS POWER TRANSMISSION DIGEST

A brief but comprehensive review of

the Dodge line of power transmission machinery is presented in a new eight-page bulletin. Featuring Flexidyne dry fluid drives and Para-flex flexible cushion couplings, two of the newest products in the line, the bulletin also offers illustrated descriptions of such products as steel conveyor pulleys, roller chain drives, various types of shaft couplings and V-belt drives. To get a copy,

CIRCLE 210 ON SERVICE CARD

### 211—JOY COMPRESSORS

Joy Unitair compressors are described and illustrated in a new 16-page bulletin from Joy Mfg. Co. Included are specifications on eight sizes of the air-cooled compressors in the 15 to 125 hp; 81 to 641 cfm range. There are cross section drawings and a complete run-down on vital components. If you'd like a copy

CIRCLE 211 ON SERVICE CARD

### 212—FLUID MIXING EDUCTORS

Schutte and Koerting Co. has published a bulletin describing their mixing eductors equipped with regulating spindles. The eductors are designed to perform intimate mixing, blending or emulsification of two fluids. The regulating spindle provides for throttling of the motive (higher-pressure) liquid flow over a wide range of load conditions, S&K reports. Normally, the eductors accomplish the mixing without required pumping in the suction fluid line. The bulletin includes sectional drawings and information on materials of construction, operation and application. Copies can be obtained by

CIRCLING 212 ON SERVICE CARD

### 213—SPECIAL COATED VALVES BULLETIN

An eight-page, photo-illustrated bulletin describing Rockwell-Nordstrom special coated lubricated plug valves is available from Rockwell Manufacturing Co.'s Meter and Valve Div. The coatings are of K-51 (Penton), Kanigen and Teflon. Descriptions of the coating properties, valves available, tables of recommended applications and photos showing typical installations are included in the bulletin. Free copies can be obtained by

CIRCLING 213 ON SERVICE CARD

### 214—SPEC SHEET ON FEED PUMP

The Chemical Solution Feed Pump, featuring a hydraulically balanced Teflon slack diaphragm not directly connected to plunger is described in a new specification bulletin from Fischer & Porter Co. F&P guarantees the diaphragm un-

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- 229—Marion Surge Bin from Rapids Machinery

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## 215—IMPERVIOUS GRAPHITE HEAT EXCHANGER

Falls Industries new bulletin uses photographs, drawings and capacities chart to describe the Impervite Modular Exchanger System for heating or cooling corrosive solutions. It is composed of basic units, each consisting of two connected concentric pipe sections, mounted in steel stacking plates. Any number of basic units can be coupled together to gain the desired heat transfer capacity, according to the manufacturer. The bulletin will be yours, if you

CIRCLE 215 ON SERVICE CARD

## 216—VIBRATORY FEEDER CATALOG

Publication of a new 32-page catalog on Syntron vibrating feeders has been announced by Syntron Co. Ample illustrated, the catalog contains complete descriptions, data and specifications for the company's complete line of six small-capacity, four heavy-duty and three extra-heavy-duty standard electro-magnetically vibrated feeders. A free copy is available.

CIRCLE 216 ON SERVICE CARD

## 217—VIBRATING SCREENS

A large selection of vibrating screens is presented in a new 48-page book published by Link-Belt Co. The book describes and illustrates each of the screens and foundry shakeouts as they are used to meet screening and shakeout needs of almost every industry. Tables of materials, selection data, easy-to-read drawings and cut-away photographs showing construction features also are given. Also included is information on accessory items including screen cloth recommendations, data on bouncing ball decks, snubbing and plugging controls, repulping decks and electrically heated screen cloths. A copy can be obtained by

CIRCLING 217 ON SERVICE CARD

## 218—INSTRUMENT, CONTROL SWITCH BULLETIN

Construction features of Allis-Chalmers Type 210 instrument and control switches and their advantages are described in a new bulletin released by the company. Available as either maintained or spring return contact types, the switches are used in conjunction with circuit breakers, transformer tap changers, motor-operated rheostats, instruments and other electrically controlled apparatus. Units covered in the bulletin include heavy-duty control switches for use in chemical plants, petro-

leum refineries and other industrial applications. If you'd like to receive a copy, just

CIRCLE 218 ON SERVICE CARD

## 219—METERING PUMP

For metering clear and corrosive liquids to chemical processes, Milton Roy Co. offers the dynamic new Model CM chemical metering controlled volume pump. The Model CM delivers maximum capacities to 28 gph in simplex designs and double that gallonage in duplex designs, Milton Roy reports. It is constructed to handle pressures to 1,100 psi. For literature,

CIRCLE 219 ON SERVICE CARD

## 220—CHEM-LINE OF PVC VALVES ANNOUNCED

J. E. Lonergan Co. has introduced a new line of valve trim and diaphragm protectors called the Chem-Line. Chief feature of the new line, according to Lonergan, is the use of plastic polyvinyl chloride for all normally wetted parts. The new line is being furnished on a special application basis to chemical plants, fertilizer plants, petroleum refineries, water treatment plants, pharmaceutical plants, natural gas distribution systems and food processing plants. Parts normally wetted by the contained fluid are of PVC. Other parts are of normal materials. Further information may be obtained by

CIRCLING 220 ON SERVICE CARD

## Materials Handling

### 221—PUMP FOR TRUCK TRANSPORTS

Waterous Co. says its compact rotary pump with 300-gpm capacity and 70-pound weight is specially suited for fast unloading of truck transports. Designed for over-the-road transports whose cargos range from petroleum to industrial chemicals, the Model HJ700 has three-lobe rotors independently driven by hardened steel pilot gears. In the pump, liquid is continuously displaced ahead of engaging rotors, Waterous reports. Further information is available by

CIRCLING 221 ON SERVICE CARD

### 222—DATA SHEET ON ELECTRO-MATIC SHOVEL

A data sheet giving specifications and general information on the Electro-Matic shovel has been made available by Munson Mill Machinery Co. The data sheet

states that the new shovel cuts unloading time for freight cars down to as little as one-third of the time formerly needed. Components are scoop, cable, pulley, drum and motor, and control box. A preformed steel cable connects the shovel with a heavy duty, grooved drum. The motor is a 3 hp, TEFC, 3 phase, 60 cycle, 220/440 volt unit. It features a magnetic disc clutch with 100 per cent overload capacity, the manufacturer reports. To get your copy of the data sheet,

CIRCLE 222 ON SERVICE CARD

### 223—ELECTRIC TRUCK FOR NARROW-AISLE USE

Subject of a four-page brochure from The Raymond Corp. is the company's new heavy duty electric truck designed for narrow aisle operations. Two direct drive steering wheels and a unique steering linkage make narrow aisle operation possible, Raymond states. Photographs illustrate features. Full specifications are listed and line drawings show dimensions. To secure your copy

CIRCLE 223 ON SERVICE CARD

## Application Equipment

### 224—SPREADER-SEEDER

A four-page bulletin from E. S. Gandrud Co., Inc. pictures and describes the Gandy Spred•N•Fold spreader-seeder. While it covers a 20 foot swath in the field, the unit folds to 7 ft., 7 in. overall width in seconds, Gandrud reports. The bulletin pictures attachments available for the spreader-seeder and gives its special features. For your copy,

CIRCLE 224 ON SERVICE CARD

### 225—NEW TYPE OF TEEJET NOZZLE

A new type of TeeJet Spray Nozzle has been introduced by Spraying Systems Co. permitting the fabricating of a spray boom from an angle-iron instead of piping. Nozzles are mounted in holes drilled in an angle-iron at desired intervals and the hose shanks are connected by hose to make up the complete boom. The complete nozzle consists of hose shank, nozzle body, cap and strainer body made of nylon, with strainer screen in stainless steel and orifice tips in either aluminum or stainless steel. Complete information on the nozzles is contained in a data sheet. Just

CIRCLE 225 ON SERVICE CARD

### 226—B&G AIR COMPRESSOR

A new gasoline engine driven oil-less air compressor, said to be extremely compact and light in weight, has been designed and built by Bell & Gossett Co. Among the compressors uses are in spraying insecticides and fertilizers, B&G reports. The new unit, which weighs 56 pounds, delivers oil free air up to 90 pounds per square inch continuously. Compressor is driven by a four-cycle, air-cooled engine equipped with recoil starter, exhaust valve rotator and oil bath air cleaner. For details and specification sheets,

CIRCLE 226 ON SERVICE CARD

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## NEWS OF THE INDUSTRY

### Equipment Supplies

#### "EXTEND-A-LOAD" MODEL ADDED TO YALE LINE

A high degree of warehouse handling versatility and important storage space savings can be accomplished with the new Extend-A-Load model of the Yale Warehouse line, reports Yale Materials Handling Div. of The Yale & Towne Mfg. Co.

Forks and carriage of this 2000, 3000 and 4000 pound capacity, narrow aisle, electric lift truck are moved forward and backward hydraulically in a pantograph fashion when picking up and depositing a load. This saves valuable floor space, Yale says, by eliminating a need to straddle the bottom load with outrigger wheels, thus permitting closer placement of stacks.

To obtain complete information on this model,

CIRCLE 227 ON SERVICE CARD

#### MANUFACTURERS OF **SODIUM ARSENITE SOLUTIONS**

##### **READE MFG. CO. INC.**

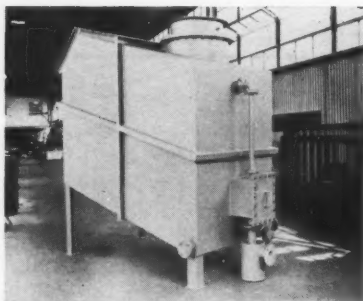
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**POSITION WANTED:** Plant or production superintendent experienced in both large and small mixing plants. Have good knowledge all phases of production and maintenance including superphosphate and granulation. Married, sober and a pusher. Write Box 675, care FARM CHEMICALS, Philadelphia 7, Pa.

**FOR SALE:** Bemis 3 bucket electro-mechanical open mouthed bagger, series #6107, contact parts, stainless steel, very accurate, available July 1st.—\$1000. C. Roy Curtis & Son, Inc., Marion, N. Y.

**SALE:** Aluminum Tanks, 18,000, 3,000 gallons. Steam Tube Dryers (Tubes Removable) 6' x 50', 6' x 30', 4' x 30'. Also Mixers, Bucket Elevators, Pulverizers, etc. Perry, 1430 N. 6th St., Phila. 22, Pa.



#### **NEW TYPE SCRUBBER**

A new type of high efficiency scrubber is being installed by Vulcan Cincinnati at the Mississippi Chemical Corp. plant in Yazoo City, Miss., to remove urea dust from exhaust gases of a urea prill cooler.

Called the Turbulaire-Doyle Scrubber, it is made entirely of aluminum and designed by Western Precipitation Corp. The scrubbing liquid is a water-urea solution which flows through the scrubber and carries away the dissolved and suspended urea dust.

The scrubber utilizes the principle of impingement of the gas stream into the scrubbing fluid at extremely high velocity. It has no moving parts. If you'd like details, CIRCLE 228 ON SERVICE CARD

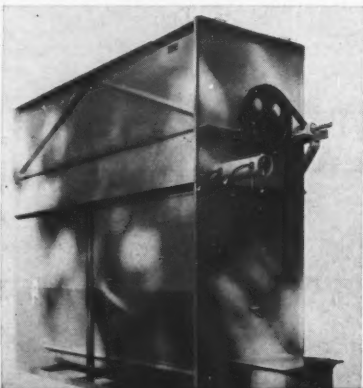
#### **RAPIDS ANNOUNCES NEW SURGE BIN**

Development of the Marion Surge Bin for continuous mixing operations has been announced by Rapids Machinery Co.

Three discharge gates operated by a single air cylinder provide a quick discharge from the mixing unit into the surge bin, Rapids reports. A 20" x 20" inspection door also is provided in the surge bin end. Capacities up to 310 cubic feet can be handled when used in conjunction with the Marion three ton mixer, the company said.

For information

CIRCLING 229 ON SERVICE CARD



### Suppliers Briefs

**Allis-Chalmers Mfg. Co.** has announced plans to acquire Tractomotive Corp. through an exchange of stock. Tractomotive would become part of the A-C Construction Machinery Div.

**Baughman Mfg. Co.** reports purchase of the former International Shoe Co. plant in Jerseyville, Ill., to keep pace with increased business. Plans call for fabrication of parts and smaller products assembly in the new plant, while assembly lines for larger bodies will be maintained in the original Baughman plant.

**Highway Equipment Co.** Two new distributors have been appointed: Rivers Trailer & Equipment Co., Inc., Jacksonville, Fla., to serve the upper northeastern quarter of Florida; and Power Brake & Equipment Co., St. Paul, Minn., to serve all but 14 counties in Minnesota.

**Hudson Pulp & Paper Corp.'s** multiwall shipping containers and grocery bags and sacks will be part of the American National Exhibition to be held in Sokolniki Park, Moscow, beginning July 25.

**International Paper Co.,** Bagpak Div. A. S. Morgan has been named division production manager; A. R. Davis, division engineer; and H. C. Roper, division director of industrial relations. All will locate in Camden, Ark. Production managers appointed for the company's four multiwall bag operations are E. R. Fogle, Camden, Ark.; J. A. Horne, Mobile, Ala.; W. M. Cathey, San Jose, Calif.; and A. C. Kuehn, Litchfield, Ill.

**Tractomotive Corp.** Appointment of Gerald R. Tennyson as product education manager has been announced by J. A. Scoggin, vice president—sales and service.

**Yale & Towne Mfg. Co.** John J. Chalmers becomes manager of the New York Sales and Service Branch of Yale Materials Handling Div.

FARM CHEMICALS



# PEST REPORTS

F  
C

By Kelvin Dorward\*

## GRASSHOPPER HATCH GENERALLY LIGHT BY LATE MAY

Although some trouble spots were beginning to show by late May, the **grasshopper** hatch in general was relatively light. The most activity was reported from New Mexico where spraying for grasshoppers was underway in Curry county. Infestations were heavy on about half of the grassland in Roosevelt county and in irrigated areas, margins and high pastures in Rio Arriba county.

Grasshopper nymphs were sufficiently heavy along ditch banks in Mesa county, Colorado, to warrant control measures being advised. Counts ranging from 5-15 nymphs per square yard were reported from margins in Larimer county but none were observed on range. Hatching was well underway in several Utah counties and controls were being applied locally in Piute, Carbon and Emery counties.

Nymphal surveys made in Texas Panhandle counties during late May showed populations much lower than for the same period last season. It appeared that only small localized areas would be treated, in contrast to the large scale control program of 1958.

Nymphal counts ranging from 15-25 per square yard were reported from 30,000 acres of rangeland southeast of Cheyenne, Roger Mills county, Oklahoma. Counts up to 50 per square yard in cropland were reported in Dewey county. Nymphs were found in field margins and most fields of central and western Kansas by late May. The highest count was over 300 per square yard in Phillips county. In general, though, counts varied from less than 1 to over 50 per square yard. Populations in Arizona were generally light with the heaviest reported being 20 per square yard in local areas of Yavapai county.

By the latter part of May, grasshopper hatching was well underway in southeast Illinois and

nymphs were very abundant along alfalfa field margins. Few nymphs were reported from Wisconsin, Indiana, Wyoming, Idaho and Oregon.

## COTTON INSECT ACTIVITY INCREASING

**Thrips** were perhaps the most damaging cotton insects during late May. The insects were extremely heavy in central Alabama and damage was apparent in older cotton in the Mississippi Delta section. Damage was severe in untreated Madison parish, Louisiana, fields and was becoming general in McLennan and Falls counties, Texas. Infestations were on the increase in many areas of Texas. Cotton was being damaged by thrips in several New Mexico counties, the San Joaquin Valley of California, and heavy populations were reported from areas in Cochise, Maricopa and Pinal counties, Arizona.

Although generally light, cotton **boll weevils** were found throughout the southern portion of the Cotton Belt. Some damage was reported by late May from areas in the lower Rio Grande Valley of Texas. Reports for the week of May 22 showed a weevil population of 72 per acre in McLennan and Falls counties, Texas, compared with 138 for the same period in 1958. Populations of the insect were light in Tensas and Franklin parishes, Louisiana, ranging from 0-152 per acre. In the Delta area of Mississippi, counts ranged from 0-50 per acre, with only 2 fields of 20 examined being infested.

Boll weevil emergence by late May was rather general throughout central Alabama, with counts of 150 per acre being recorded in Sumter county, 350 in Hale county and 200 in Tuscaloosa county. Weevils were found in all cotton fields examined in the Florence, South Carolina, area and many buds were being cut. Counts averaged 31 weevils per acre. Only one weevil was found in Hardeman county, Tennessee, but emergence is expected to continue through June.

**Fleashoppers** and **aphids** on

cotton were light from most areas reporting. The exception was Hale county, Alabama, where aphids were heavy on seedling cotton. Some damage from **bollworms** was reported from the lower Rio Grande Valley of Texas and there was an unusually early buildup in the Imperial Valley, Imperial county, California. **Cutworms** caused sufficient damage in some California cotton fields to require replanting. These insects also caused some damage in Texas, Missouri and Tennessee.

## MEADOW SPITTLEBUG

The **meadow spittlebug** was prevalent over a wide area by the latter part of May. The insect was found throughout Maryland and Delaware and heavy populations were recorded on alfalfa and clover in southwestern Virginia. Spittlebug nymphs were reported from New York, Massachusetts, Michigan and Wisconsin by early May. By late May the insect was in outbreak proportions in eastern Indiana, with counts highest on record for the area. In the northeastern part of the state the average count was as high as 500 per 100 stems and one field in the southeastern area averaged 950 per 100 stems. Counts in the western part of Indiana were much lower, averaging 75-100 per 100 stems.

Spittlebug populations in northern Illinois had decreased an estimated 50 per cent by late May but nymphal counts were still 75-200 per 100 stems. In northwestern Illinois counts up to 400 per 100 stems were recorded. Heavy populations of the insect on grasses were found in the Richardson Grove area of Humboldt county, California, but low counts were reported from Nez Perce county, Idaho.

## EUROPEAN CORN BORER

The early May **European corn borer** populations in New Jersey were generally higher than those in 1958 and the damage outlook had increased. Infestation outlook for potatoes and tomatoes was the second highest in 5 years. During

(Continued on page 46)

\*Chief Staff Officer, Survey & Detection Operations, Plant Pest Control Div., Agricultural Research Service, USDA.

## PESTS (Continued from page 45)

the same period, emergence was underway on the Eastern Shore of Maryland and in Delaware. In Virginia egg masses were hatching on the Eastern Shore by May 12. By the latter part of May adult emergence was 100 per cent in Poinsett county, Arkansas, but no eggs had been found on corn in the area. In northern Alabama a few egg masses were being deposited on older corn.

European corn borer adult emergence was 4 per cent in southern Illinois by the middle of May.

Pupation was underway in all areas of the state except the northern section. Emergence had begun in southeastern Missouri but pupation had not started in the northern part. By late May pupation was 20-30 per cent in Pottawatomie county, Kansas, but no pupation had been reported from Minnesota or Wisconsin.

The **greenbug**, which was reported last month in FARM CHEMICALS as being damaging in Oklahoma and Texas, continued to cause damage in several states during May. Although by late May populations were on the de-

crease in Missouri, late planted oats in the northeast and north central areas were severely damaged. Counts up to 5,000 per linear foot were recorded. Oats from south central to north central Illinois and small grains in southern Iowa were being seriously damaged. Greenbugs were also present in most southern Minnesota grain fields but only one field in Nicollet county was reported as being seriously damaged.

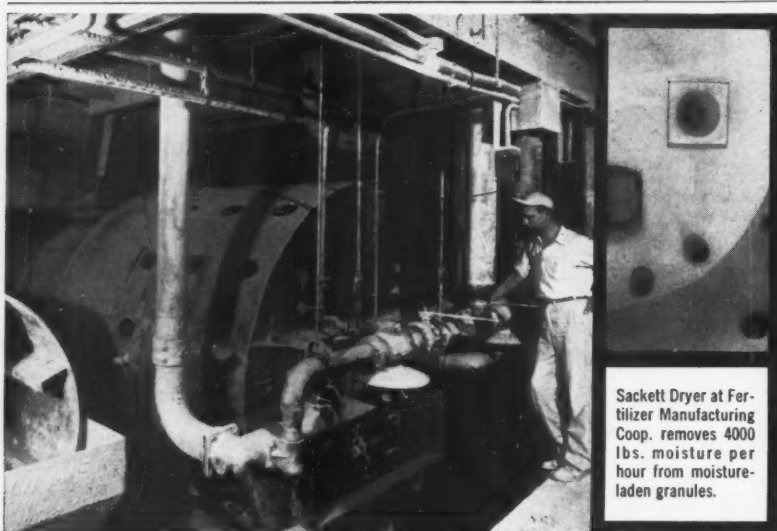
The **pea aphid** decreased in some of the southern areas reported having heavy populations last month but increases were noted in states farther north. States with abundant populations in late May included Maryland, Kansas, Iowa, New Mexico, Colorado, Utah and Idaho.

Among the fruit insects active in May, heavy populations of **mites** were reported from Massachusetts and were becoming troublesome in some Maryland apple orchards. Heavy populations were recorded from unsprayed orchards in several New Mexico counties. Mites were building up on English walnuts in the San Jose area of Santa Clara county, California, by late May. **Aphids** were reported as heavy on various fruit trees from localized areas of Missouri, New Mexico, Utah, California and Idaho.

**Colorado potato beetle** was becoming abundant on potatoes and tomatoes in Delaware, Maryland, Virginia and New Jersey by late May.

The XIX brood of the thirteen-year-variety of the **periodical cicada** emerged during May over a wide area. States reporting the cicada during the month were Mississippi, Alabama, Georgia, Tennessee, North and South Carolina, Virginia, Missouri, Indiana and Arkansas. This is a rather heavy brood and in many areas noticeable damage was caused by oviposition in various trees; fruit, ornamental and forest.

During May, a **pine saw fly** was severe on pines in widely scattered areas of Virginia and in areas of North Carolina, Maryland and Pennsylvania. **Tent caterpillars** were unusually heavy and damaging in many areas during May. States reporting heavy populations include Rhode Island, Pennsylvania, Ohio, Virginia, West Virginia, Utah, Nevada and California. ▲



## Plibrico lined furnace maintains output of 20 TONS fertilizer PER HOUR

... reports Albert Spillman, general manager of Fertilizer Manufacturing Coop.

Continuity of operation is imperative in this process. Shutdowns mean lost production. That is why this furnace, which reaches temperatures as high as 1100°F., is lined with Plibrico Standard Air Bond. The air-setting feature of this plastic refractory lining provides greater strength uniformly throughout the entire lining thickness of the dryer and transition chamber.

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# PATENT REVIEWS

F  
C

By Dr. Melvin Nord

## PESTICIDES

**U. S. 2,875,118**, issued Feb. 24, 1959 to George O. Turner, assigned to the Dow Chemical Co., provides a method for the fumigation and disinfection of soil infested with nematodes, fungi, and other invertebrates which attack plant roots. Compounds of the type 1-chloro-2-iodo-ethane are utilized for this purpose.

**U. S. 2,875,119-21**, issued Feb. 24, 1959 to Leo Trademan, Marshall A. Malina, and Louis P. Wilks, assigned to Velsicol Chemical Corp., provides additives to dry insecticide formulations which will prevent deterioration of the insect toxicant ingredient during storage, without being phytotoxic. Glycols are used as the additives.

**U. S. 2,875,122**, issued Feb. 24, 1959 to Milton Kosmin, assigned to Monsanto Chemical Co., discloses the use of certain sulfo-esters of certain benzoic acids as fungicides, e.g. 2-(sodium sulfo) ethyl ortho-chlorobenzoate.

**U. S. 2,875,123**, issued Feb. 24, 1959 to James C. Wygant, assigned to Monsanto Chemical Co., discloses the use as insecticides of hexachlorobicycloheptene sulfonic acids.

## SHIELDING PLANTS FROM FROST BY USE OF FOAM

**U. S. 2,875,555**, issued March 3, 1959 to Bernard J. Thiels and Norman Wright, assigned to the Dow Chemical Co., discloses a method of shielding plants from frost damage by the use of foams which last 8-12 hours.

An example of a method of preparing such a foam is the following: 5.0 parts of purified soaproot extract saponin and 7.5 parts of methyl cellulose of the 15 centipoise viscosity grade were dissolved in 1000 parts of water. The solution was prepared by adding the dry ingredients to about one-third the total volume of water which had been separately heated. After about five minutes, the balance of the water was added at room

temperature with continued stirring.

A very stable foam can be generated from the solution by spraying it through a duct against a double layer of 100 mesh copper screen, along with a stream of air.

## SOIL CONDITIONER

**U. S. 2,877,599**, issued March 17, 1959 to Elmer W. Hebestreet and Joseph T. Plunkett, discloses a method of applying carbon black to soil, as a soil conditioner.

The effects of adding carbon black to the soil are (1) it improves the absorption of solar radiation, thus maintaining a higher soil temperature, and (2) it facilitates the absorption and retention of water.

In order to facilitate the addition of carbon black to the soil, it is combined with a carrier or dispersing agent which releases it in the soil as a result of weathering (e.g. a fibrous organic material having a fertilizer value, mixed with gypsum).

## HERBICIDES AND PLANT GROWTH REGULANTS

**U. S. 2,875,030**, issued Feb. 24, 1959 to William H. Brugmann, Jr., Howard L. Yowell, and Allen R. Kittleson, assigned to Esso Research & Engineering Co., discloses a series of defoliating compounds containing the  $NSCCl_3$  group (e.g. N-trichloromethylthio 3-methyl tetrahydrophthalimide).

**U. S. 2,875,031**, issued Feb. 24, 1959 to Winfried Kruckenberg and Ludwig Eue, assigned to Farbenfabriken Bayer A. G., discloses weed-killing compositions containing di-mercapto-thio-diazoles. Weeds may be destroyed by these compounds at any stage of growth, starting from germination.

**U. S. 2,876,088**, issued March 3, 1959 to Gideon D. Hill, Silas S. Sharp, and Dale E. Wolf, assigned to E. I. du Pont de Nemours & Co., discloses a process for controlling weeds in soils of high adsorptivity. A herbicidally active aromatic aliphatic substituted urea and a high boiling hydrocarbon oil are applied to the soil.

**U. S. 2,876,089**, issued March 3, 1959 to William H. Brugmann, Jr., Arnold J. Morway, and Jeffrey H. Bartlett, assigned to Esso Research & Engineering Co., discloses improved herbicidal compositions which do not have the usual drifting characteristics of 2,4-D and 2,4,5-T. The esters of 2,4-D and 2,4,5-T are improved in adhesiveness by dispersing grease-forming soaps in them.

**U. S. 2,876,090**, issued March 3, 1959 to Robert W. Leeper and Victor C. Fusco, assigned to Olin Mathieson Chemical Corp., discloses a composition which promotes the flowering on pineapple plants—namely, beta-hydroxyethyl-N-beta-hydroxyethylcarbazinate.

## FERTILIZERS

**U. S. 2,875,032**, issued Feb. 24, 1959 to Jacques Bursaux, Henri Ancelle, and Henri de Saint Chamant, assigned to Comptoir des Phosphates de l'Afrique du Nord, describes a process of preparing a phosphate fertilizer containing 35-44 per cent assimilable phosphoric acid.

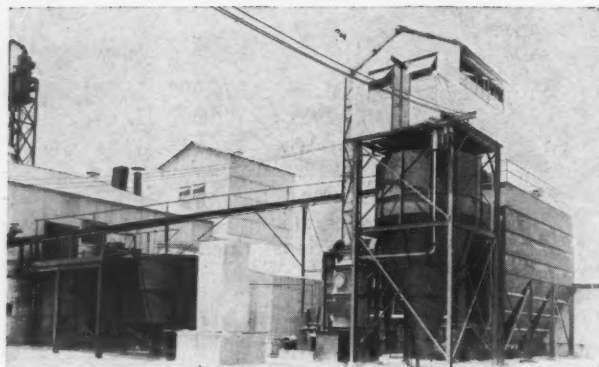
A mixture of crude phosphate and an alkali metal chloride is reacted with phosphoric acid to produce a comparatively dry pulp or paste. This is then subjected to calcination at 1000-1200°C. in the presence of water vapor.

**U. S. 2,878,112**, issued March 17, 1959 to Willard L. Morrison, assigned to The Union Stock Yard & Transit Co. of Chicago, describes a method and apparatus for the composting of organic manure, which provides a product which may be shipped, stored, and used without unpleasant odors and without deterioration of paper bags in which it is shipped.

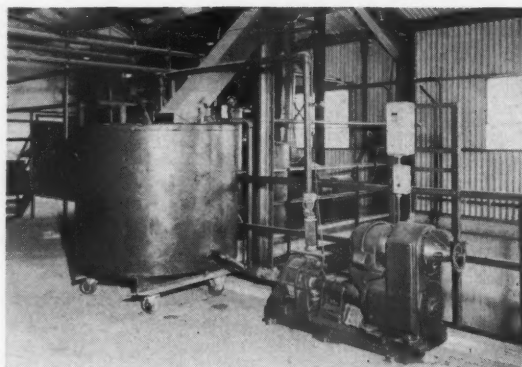
**U. S. 2,878,165**, issued March 17, 1959 to John E. Cottle, assigned to Phillips Petroleum Co., describes a system for the storage of ammonia in an underground cavern formed in a salt formation, and the recovery of the stored ammonia in a substantially anhydrous condition.



# SELLING TRACE MINERAL S



Spray dryer and storage tanks used in production of trace elements.



Pumps and dissolving equipment.

*The big job for fertilizer manufacturers: Convince farmers that trace mineral* elen

By GORDON CUNNINGHAM

**O**VER AT Tennessee Corporation's East Point, Georgia, plant those in charge of the special trace mineral salts program know that the surface has hardly been scratched. The big job is up to fertilizer manufacturers to convince farmers that trace mineral elements provide the missing links in the chain of essential elements required for complete plant nutrition.

As knowledge of specific needs and levels continues to develop, Tennessee will continue to enjoy the unique position of being able to formulate various trace element mixtures to meet such needs.

The fact that Tennessee is basic in the production of four trace elements—iron, manganese, copper and zinc—affords Tennessee's customers several key advantages, such as:

- 1) getting special formulations to meet specific needs at a cost which compares favorably with purchasing the individual salts at the same levels,
- 2) eliminating storage and mixing problems,
- 3) getting a uniform mixture for a single, simple addition in his production operation.

Tennessee maintains adequate stocks of the raw materials required in the production of trace elements salts. These are processed into soluble salts similar to those used as major element ingredients in fertilizer and also into less soluble neutral salts which can be safely applied as a spray or dust directly to the foliage.

## THE SELLING JOB

Producing a better fertilizer should net the manufacturer a premium price. But farmers must first be made to understand what is happening to his soil as the result of the growing usage of higher analysis fertilizer with correspondingly greater crop yields.

In recent years the major components of mixed fertilizer have been refined to a higher and higher degree of purity. With soils being continually drained of their available supply of essential trace minerals, these elements must be replaced in order to maintain continuing high production of top quality crops.

Recognizing the problem of trace element deficiency

a little more than twenty years ago, the Tennessee Corporation introduced a product called Es-Min-El, this trade name being derived from the phrase "essential mineral elements."

This product originally contained manganese, copper, zinc, iron and boron in a balanced formulation designed to prevent over-dosage of any single element where used according to directions.

## FLORIDA PROBLEMS STUDIED

This formulation was based on results obtained in Florida, where trace element problems were first recognized as a major problem. Outstanding results were obtained on many varied crops in all sections of the country from the use of this product as a supplement to regular chemical fertilizers.

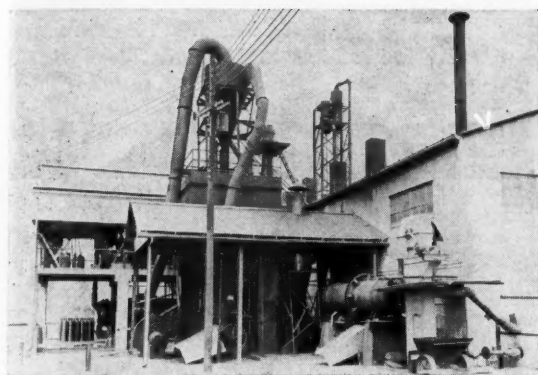
As further knowledge regarding trace mineral deficiencies of crops was developed, the Tennessee Corporation started formulating other specific mixtures designed for special crops and soil conditions. They now formulate according to customer specifications, adding any elements desired in any designated ratio, providing in one package any formulation desired by the fertilizer manufacturer.

Since different plants vary in their trace element requirements and many diversified soil conditions create further complications as to available levels of elements, it is impossible to supply a single trace mineral mixture which will suffice in all cases.

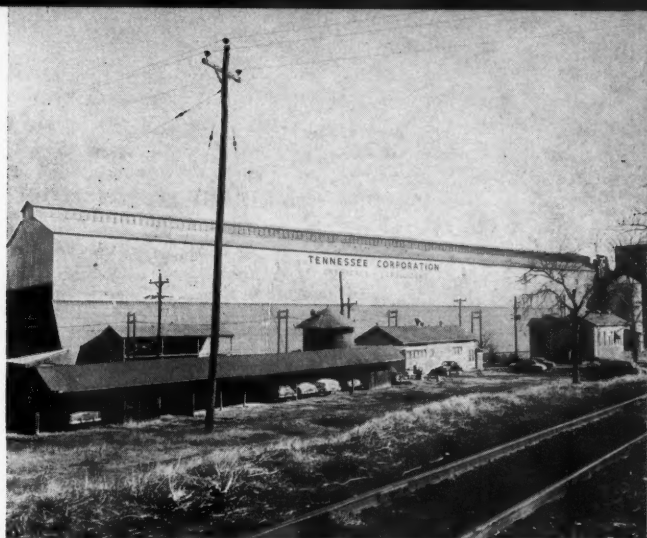
Through years of research Tennessee Corporation has developed new types of trace mineral salts suitable for use in nutritional mixtures designed for direct application to the plant. These materials are produced in fine particle size for uniform mixing and ease of application. They utilize spray driers and micronizing equipment and thus provide material which will not clog spray nozzles when applied.

The safety factor is maintained by producing neutral or non-acid forming salts which prevent burning where used for foliage application. Materials of this type which are produced include the trace elements manganese, copper, zinc and iron.

# AL SALTS



Grinding and drying equipment at the manganese plant.



General view of the main plant where trace elements are produced. All four photos were taken at Tennessee Corporation's East Point, Ga., facilities.

eral elements are essential to maintain continuing high production of top quality crops

Their latest development is a chelated type iron compound which is extremely effective in correction of iron deficiency in plants. It is also effective for use as a softener for arsenicals and other insecticidal materials. These compounds while not water soluble to any great extent are made available by the organic acids of the plant and are readily absorbed by the plant tissue. Quick response is noted; however, due to the small amounts applied it is necessary to make repeat applications to achieve complete recovery.

These soluble trace mineral salts are similar to and compatible with other fertilizer ingredients; thus they are ideally suitable for addition to mixed fertilizer to provide adequate levels of these elements. And since most soils are becoming more and more depleted in available sources of trace elements, the inclusion of small amounts now may well prevent the future development of serious deficiency problems. Serious problems already exist on many muck and calcareous soils, where leaching has taken place or high alkalinity is a factor. It has become common practice to treat such soils with trace mineral applications. Many other soils are in a border line category and good response is obtained through the use of a complete plant food containing these trace mineral salts.

## PROVIDING "MAINTENANCE"

Much thought is now being given to the addition of small amounts of trace elements to provide a maintenance amount and replace that being removed by each crop taken off. Tennessee considers this as an insurance factor which could well pay handsome dividends on future production.

Where the grower is content with low crop yields little may be gained through the use of trace elements. The progressive grower who desires to lower his per acre cost of production by increasing the yield to the highest economic level will in most instances greatly benefit from having trace minerals included in his plant food program. Not only can he expect to maintain top production, but the quality will also (in most cases) be noticeably improved. Many instances have

been reported indicating increased protein content in crops, higher sugar content, greater levels of other minerals and increased vitamin and enzyme levels where fertilizer containing trace elements was used and compared with regular fertilizer of the same grade without such supplements.

## ADDING TRACE ELEMENTS TO LIQUIDS

At the present time there is much interest being shown in the use of trace elements in liquid fertilizers. Due to chemical reactions it is extremely difficult to maintain these elements in solution. Most of the elements, and especially manganese, react with the phosphates and other ingredients to form heavy precipitates which settle out rapidly.

While these compounds which are formed may still be available for plant nutrition they are not properly distributed in the fertilizer application unless agitation is supplied. While adequate levels of some of these elements may be maintained by chelation and other reactions this does not appear at present to be an economic measure for full scale field operation.

Considerable work is currently being carried on with state agricultural experiment stations in determining the trace elements or combinations required in certain locations on various soil types for proper nutrition. Efforts are also being made to standardize on uniform methods of analysis and to determine the optimum trace element content in various types of plants. Much progress is being made and steps taken to provide the growers with the most satisfactory materials to combat the growing problem of trace element deficiencies.

The actual role of trace elements in plant nutrition is not completely understood. Their essential nature and relationship to the enzyme systems, hormones, amino acids and other functions in plant and animal metabolism is recognized but not fully understood. Fortunately such information is not essential for their utilization. They are currently often classed as catalysts and such consideration is not illogical since they are required in such small amounts. ▲

# THE HERBICIDE MARKET

*A group of farmers selected statistically to represent all U.S. commercial farms were asked for information on their herbicide purchasing and use. Here are some facts from the report on this survey by Doane Agricultural Service.*

**A** COMPREHENSIVE SURVEY of the herbicide market has just been completed by the marketing research staff of Doane Agricultural Service, Inc. The report on this survey is now available and will be of interest to all who are connected with the manufacture or sale of chemical weed killers.

Elmer C. Denis, manager of the Doane Research Division, reports: "This first report is the beginning of a service which could well be a milestone in the marketing of herbicides. To date, little or no reliable information has been available for manufacturers of farm chemicals to use as a guide to determine market potentials, sales forecasts, trends in purchase and use, targeting of advertising and sales effort, and over-all marketing decisions relating to new product acceptance and product development."

## PANEL OF REPRESENTATIVE FARMERS

This key marketing information was assembled through a survey to the Doane Countrywide Farm

Panel, a group of farmers selected statistically to represent all U. S. commercial farms. Of the 2,242 questionnaires mailed, a total of 1,970 usable returns were received, an 87.9 per cent response. From the information received, projections can be made to the total U. S. farm market for herbicides.

Since the information is prepared on a regional as well as national basis, it can be just as important to the smaller manufacturers as to the industry's giants, Mr. Denis advises.

The panel members were asked to provide information on the following: brands of herbicides purchased, expenditures for herbicides by brand, acreage of crops treated, types of herbicides used, brand acceptance, source of purchase and recognition of herbicide brand names.

*Facts from this initial report covering the herbicide market for 1958 give us an insight into the type of information that will be regularly available to the industry. The 1959 report will be completed in October.*

## FACTS FROM THE REPORT

It was found that 42.9 per cent of the farmers surveyed used chemical weed killers in 1958. This, of course, means that 57.1 per cent did not use chemical weed treatment that year. However, over half of these non-users reported herbicide use in previous years. Of the users in 1958, 6.3 per cent stated it was their first use of herbicides.

Replies indicate there is a strong relationship between income and use of herbicides. Of the farmers with over \$25,000 annual income, 57.7 per cent used in 1958, while only 33.1 per cent of these in the \$2,500-\$4,999 income bracket used these chemicals. With regard to size of farm, no such relationship exists.

*Generally, more of the farmers with larger acreages used herbicides; however, there was very little difference in number of users between farmers with 100-219 acres and those with over 500 acres.*

CROP ACREAGE TREATED WITH HERBICIDES BY PERCENT OF CROP AND TYPE OF TREATMENT ON COMMERCIAL FARMS IN THE U.S. IN 1958

Crop	Total Percent	Pre- Emergence Percent	Post- Emergence Percent
Corn	51.3	53.4	51.2
Small Grains	35.5	4.3	37.7
Sorghum	5.3	0.5	5.6
Cotton	1.9	16.7	0.8
Vegetables	1.5	4.3	1.3
Hay	1.2	0.1	1.3
Soybeans	1.1	16.6	0
Flax	0.5	1.1	0.5
Potatoes	0.4	0	0.5
Peanuts	0.4	0	0.4
Rice	0.2	0	0.2
All Others	0.7	3.0	0.5
TOTAL	100.0	100.0	100.0



## WHO USES PRE-EMERGENCE TREATMENT

Farmers in the higher income groups are much more likely to use pre-emergence treatment for weeds. In fact, the survey reveals that about five times as many farmers in the \$25,000 and over income bracket used pre-emergence sprays than those in the \$2,500-\$4,999 bracket. The lower income farmers use more post-emergence and pasture weed and brush treatment, however.

Pasture weed and brush sprays also tend to be used more on smaller farms. This may be due to the higher percentage of fence rows on smaller farms. Post-emergence sprays are used more on larger farms. Pre-emergence herbicides appear to be most common on farms in the 220-499 acres size group.

*A projection of the crop applications of the panel members indicates that almost 47,000,000 acres of cropland were treated with herbicides by commercial farmers in the U. S. in 1958.*

Of the total crop acres on which herbicides were applied by panel members, corn accounted for 51.3 per cent. Small grains crops received the second highest percentage of herbicides making up 35.5 per cent of all the acreage receiving these chemicals. Future reports will show not only the number of acres by crop that were treated with herbicides, but also the total acreage of these crops grown. Also, the crop applications of brands will be included. In this way, a comparison of product potential by crop can be made.

Percentages of crop applications varied by type of herbicide, applied. Pre-emergence applications on corn were 53.4 per cent of all the acres applied with this type of herbicide, but small grain crops accounted for only 4.3 per cent of the total acreage applied with pre-emergence sprays. Cotton and soybeans, which received only 1.9 per cent and 1.1 per cent respectively of the total herbicides, accounted for 16.7 per cent and 16.6 per cent of the acreage devoted to pre-emergence treatments.

## ALL BRANDS, MANUFACTURERS LISTED

The Doane report includes a listing of all brands and manufacturers that represented one per cent or more of total expenditures of herbicides. In addition, each brand and/or manufacturer name is listed by per cent of total acres applied by the brand and the per cent of total users that purchased the brand.

*The relationship between dollars spent for the*

*brand, acres applied and number of brand users gives each company an insight into the type of advertising and sales effort required to expand herbicides sales.*

## HOW TO USE THE INFORMATION

For example, consider brand "A." Although it accounted for 3.70 per cent of farmers' expenditures for herbicides in 1958, it was used on 5.47 per cent of total acres applied with weed killers and had 5.38 per cent of the total users. Information of this type can be used by the manufacturer to plan a promotional program designed to increase Brand "A's" share of market expenditures, possibly by encouraging more intensive product use.

In contrast, Brand "B" accounted for only 5.66 per cent of farmers' herbicide expenditures while it was used on 9.30 per cent of the total acres and by 5.54 per cent of total users. The users of this brand appear to apply it on larger acreages so it would seem the primary emphasis should be in gaining a greater number of users.

In other cases, great variations in share of market by brand were noted between regions. In such cases, future herbicide reports can be used by manufacturers to measure the results of promotional campaigns designed to build sales in key regions.

There is a wealth of other information available as part of the first Doane Herbicide Report. An analysis of the following factors is also included:

- 1) Reasons for preference of type of herbicide
- 2) By whom herbicides are applied
- 3) Consumer acceptance of brands
- 4) Consumer recognition of brand names
- 5) Source of purchase
- 6) The year herbicides were first used, and
- 7) Opinions of farmers on how chemical weed killers can be improved.

A similar report is to be published annually for the farm chemicals industry. To make these reports more valuable, Doane research specialists plan to compile the data on a regional as well as on a national basis every year.

Each report will be available in October and will cover the current year. Thus, manufacturers will be able to make up-to-the-minute comparisons to denote shifts in purchase and use of herbicides. It will also provide a means whereby companies can measure the effect of their advertising and promotional campaigns.

**Application of Types of Herbicides on Commercial Farms in the United States in 1958, by Income Group and Size of Farm**

Type of Herbicide	All Farms Total Percent	INCOME GROUP			
		2500-4999 Percent	5000-999 Percent	10,000-24,999 Percent	Over 25,000 Percent
Post-Emergence Crop Spray.....	51.7	51.2	52.7	53.3	45.3
Pre-Emergence Crop Spray.....	6.8	3.8	5.9	8.0	18.2
Pasture Weed and Brush Spray.....	41.5	45.0	41.6	38.7	36.5

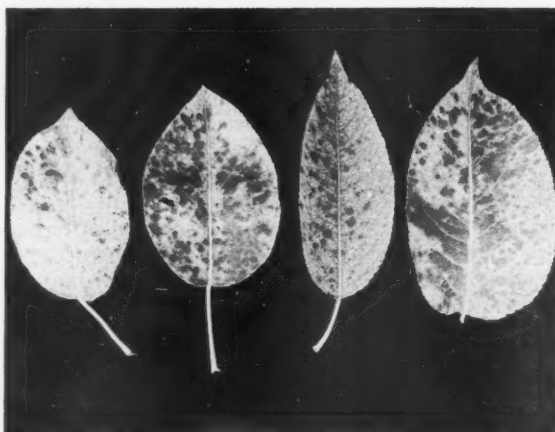
  

Type of Herbicide	All Farms Total Percent	SIZE OF FARM			
		0-99 Acres Percent	100-219 A. Percent	220-499 A. Percent	500 A. or more Percent
Post-Emergence Crop Spray.....	51.7	49.8	51.1	51.6	55.5
Pre-Emergence Crop Spray.....	6.8	4.3	6.7	7.8	6.3
Pasture Weed and Brush Spray.....	41.5	45.9	42.2	40.6	38.2

## TECHNICAL REVIEW



**Pear trees in Washington State.** The second tree is untreated, while the rest have received injections of iron citrate. Note complete restoration to normal health of all treated trees. Because the new synthetic chelates are more efficient, this treatment is no longer used.



**Spotted green on chlorotic or yellow leaves** resulting from sprays of iron chelates to iron deficient pear trees. When sprays are not applied early enough in the season only partial greening takes place.

## METAL CHELATES in Agriculture

**Zinc deficient and normal sweet cherry.** In some soils sweet cherry makes a rapid and complete recovery from zinc deficiency following application of zinc EDTA to the soil.



by NELS R. BENSON\*

**A**N ORGANIC COMPOUND with two or more reactive sites sufficiently separated by other atoms in a chain which can bend in a semicircle and both sites react with the same metal ion is a chelating agent. Thus, the metal chelate is a ring structure. Some of the metal chelates are only slightly reactive chemically. They are spoken of as "stable" compounds. Some are also soluble in water as well as being chemically stable. It is the property of being stable or non-reactive and yet water soluble that makes them of interest in agriculture.

The simplest chelating agents are amino acids or di-carboxy acids in which both reactive groups become chemically attached in the same metal ion. In nature there are a great many such compounds, many of which are very complex. Chlorophyll, for example, is a chelate of magnesium. Our interest in naturally occurring chelating agents is mainly directed to an understanding of what they are and how they function in the life process. These naturally occurring compounds lack some of the properties which make them useful in supplying the metal micronutrients to plants. The principal trouble is that they are not biologically stable, that is, they make good food for microorganisms.

#### POOR FOOD FOR MICROORGANISMS

A synthetic material called EDTA (ethylene diamino tetra acetic acid) was prepared a number of years ago. This substance was poor food for microorganisms. It formed compounds with most metals none of which were very reactive and the least reactive of the compounds of common metals was the iron compound. Of further interest was the fact that these metal chelates were water soluble. Finally, it was found that the chelates of iron, zinc, copper or other nutrient metal were not toxic or harmful to the plant if given in a reasonable dose. Although the metal chelates were very stable the plant had the capacity to extract the metal from the chelate once the metal chelate had entered the plant. EDTA, therefore, found special application in agriculture. Other compounds of similar chemical constitution to EDTA were soon prepared to meet special needs.

Because of the important place that EDTA found in agriculture and chemical industry, much research has been undertaken during the past decade on substances capable of chelation. The paper pulp manufacturers of the Pacific Northwest have long had a problem of disposing of their "sulfite waste liquor." Among other things, this waste product contained ammonium lignin sulfonate. Lignin is a complex substance of high molecular weight, but is so constituted that the sulfonic acid derivative has regular recurring reactive sites which can chelate the common nutrient metals. This substance and its metal chelates

are water soluble. It is also non-toxic to plants but it lacks the biological stability of the EDTA complexes. Nevertheless this and similar by-products of paper manufacture seem to have found an outlet which is of mutual benefit to the paper industry and agriculture.

#### ADDING A LITTLE ORGANIC MATTER

Old-time plant physiologists prepared nutrient solutions containing all the then known substances necessary for plant growth. But the plants did not do well. Some, as my old professor and good friend, Dr. Leukel, would add a little organic matter and this would make them grow. He was doing two things, namely adding some nutrients not known to be needed but more important he was adding some natural chelates which kept iron and other metals in solution so that the plants could feed on them. Iron citrate is a chelate that has long been used to keep iron in solution in the presence of chemicals that would otherwise make it insoluble. For this reason iron citrate has long been a constituent of nutrient solutions. Iron citrate has also been used for many years much in the same manner as the better modern chelates for supplying iron to trees suffering from a type of anemia known as chlorosis. In horticultural literature as recent as 1946, there are recommendations for the application of iron citrate to chlorotic fruit trees by boring holes into the trunks of the trees and inserting a capsule of the chemical into the hole. Once inside the plant the iron citrate moved to the place where iron was needed and corrected the anemic condition. Attempts were made to spray iron citrate but this compound was not sufficiently stable to be eminently useful.

#### EXPERIMENTS WITH IRON EDTA

About 1950 iron EDTA began to be used experimentally for supplying iron to plants. It was first reported as a successful chemical for use in pure chemical solutions. A year later (1952) there appeared several reports of its use in soils. The most successful use of iron EDTA in agriculture occurred in Florida. This is an exciting story of the huge citrus industry which was slipping rapidly, then revived by one remarkable chemical, IRON EDTA. (This story will be told by Dr. Leonard in a story on metal chelates in the August issue).

Out in the west there is much naturally alkaline soil. Too many of these are being made constantly more alkaline by irrigation water that contains excess alkalinity. Quickly, the available chelates of iron were tested for the control of chlorosis due to this alkalinity. None was as successful as the iron EDTA in Florida. Chemical companies applied their research departments to finding new and better materials and better and more suitable materials were found.

(Continued on the following page)

\*Associate Soil Scientist and Horticulturist, Tree Fruit Experiment Station Wenatchee, Washington.



## TECHNICAL REVIEW

These, too, are chelates, more complex than EDTA and also more expensive.

Zinc is more frequently deficient than iron. Field crops respond to applications of zinc salts to the soil but trees seldom do. Usually a deficiency of zinc can be corrected by spraying the tree with a zinc salt. With some tree species, particularly sweet cherry, a deficiency of zinc is extremely difficult to overcome. Orchards have been removed because they became unprofitable due to a deficiency of zinc which could not be alleviated by the present methods. The chelates of zinc have been explored as a means for increasing zinc uptake in such orchards. Some field experiments have shown that zinc EDTA is an effective source for deficient cherry trees.

Manganese is also deficient in many orchard trees grown on alkaline soils. A deficiency of this metal does not present the extreme problems that zinc deficiency does, but even so orchardists have found manganese EDTA a useful substance in maintaining healthy trees.

Chelates of copper and other metals have been used by research workers to find nutrient deficiencies. The chemical companies that manufacture these have been most generous in preparing and supplying whatever chelate that the researcher wished, only for the asking.

### ABSORPTION AND UTILIZATION

Studies of metal chelate absorption and utilization have been made with radioactive tracer elements. These studies show that the whole chelate, metal and all, is absorbed as a single molecule and remains a single molecule inside the plant until it reaches a spot in the plant where the metal is needed for some life process. Here the plant is able to remove the metal from the chelate. The chelate is slowly disintegrated in the plant and serves as food.

Plants normally absorb metal ions and acid ions independent of each other. It has been shown that the roots, especially the root surface, may be cluttered with adsorbed chemicals. Under adverse chemical conditions, such as occur with chlorotic plants, it is difficult for iron to cross this mass of adsorbed chemicals, but when the iron is protected by chemical chelation it is absorbed as a neutral or non-ionic

molecule and is not affected by the presence of adsorbed chemicals. It therefore passes freely into the plant.

Since iron chelates have been so successful in correcting citrus chlorosis in Florida, one may inquire for cause of less success in the orchards on alkaline soils in the west. There are several reasons for this difference. First the acid sands of Florida offer little opportunity for chemical reaction between the chelate and the soil. In alkaline soils a chemical exchange gradually takes place which removes the iron from the chelate to form an insoluble iron hydroxide in the soil. Thus, the successful iron EDTA of Florida did not persist long enough in alkaline soils to supply much iron to the plants. Chemists quickly prepared chelates of greater stability but these reacted with the soil so the whole molecule adhered to soil particles preventing absorption by plants. This reaction with the soil was slow, so that moderate success was obtained and chlorosis could be overcome with sufficient chelate but the treatment proved expensive. Chemists prepared still more stable chelates with less tendency for soil fixation. Now one chelate of iron is approximately as effective in alkaline soils as iron EDTA is in acid soils of Florida. Although this new compound is expensive it is being used for the correction of chlorosis in ornamentals and high value crops in the Southwest.

Since iron EDTA and HEEDTA were not sufficiently effective in alkaline soils for the correction of chlorosis in tree fruits, horticulturists immediately attempted to avoid the soil inactivation by spraying the chemicals directly on the foliage. The first attempts were disappointing. The iron chelates were phytotoxic and had little or no "carry-over" effect into the next year. It was soon learned that chlorosis must be prevented rather than corrected, that is the iron must be present in the leaf while it is young so that the normal green color can develop with the leaf. Old yellow leaves would not turn green. Then a new iron chelate, DTPA, came along that was less toxic to the foliage. But pear fruits are easily russeted and scabbed by strong chemicals. When this chelate was sprayed on the tree, drops would collect on the fruit and form marks or scabs. To avoid this, horticulturists applied the spray as a mist concentrate. Thus, two concentrate iron DTPA sprays, the first shortly after bloom and the second two or three weeks later, gave adequate protection against chlorosis in pear trees growing in alkaline soils.

After the success of iron DTPA sprays on pear trees the paper by-product iron chelates were also tested. This material was found to be much less toxic to the foliage than the previously used synthetic chelates, but it was also necessary to use a higher dose to obtain the same response.

The zinc EDTA and other synthetic chelates were also tested as sprays. These proved to have very low toxicity as compared to the iron compound, and the zinc EDTA was less caustic than the inorganic salts of zinc. Thus it became possible to apply more zinc on problem trees. With adequate zinc the natural tree health was restored.

Chelates are here to stay. They are expensive but they find special uses. They offer a means to bypass the blocks which prevent absorption of the micro-nutrient metals. ▲



Peach trees in Provo, Utah. The tree in foreground is chlorotic. The second is green; it received one pound of iron DTPA applied to the soil. The third was untreated.

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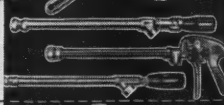
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## How's your marketing I.Q.?

**That question** was asked a few hundred times last month during the NPFI convention at the Greenbrier. And we hope that it will continue to be asked many more times in the coming months.

If you were in attendance, you may have been "bothered" so much by the *nine questions* we asked in our marketing packet that you decided to take another look at the articles which appeared in our recent issues, containing the *answers*. We hope you got all the answers right—but if not, don't feel too badly. We don't think very many people did!

*We've been told that several of the articles are real classics. We don't know about that. But we are convinced that it's the first time that so much worthwhile marketing material has been assembled in the farm chemicals publishing field.*

Here are the articles that went into the marketing packet:

*Creative Pricing* by Fred C. Foy, January.

*Keystone For Future Profits*, by Theodore Nowak, January.

*Put MUSCLE in Your Marketing*, by Erwin H. Klaus, February.

*Secrets of Persuasion*, by Ted Pollock, May.

*How Do Your Dealers' Attitudes & Knowledge Rate?* (Staff Report about dealer survey), June.

**It was just six months ago** that we started our now popular marketing approach. Holding no false illusions, we knew that our job was cut out for ourselves. Emphasizing marketing is nothing new—but finding something worthwhile to report each month *that will help you solve your marketing problems* "takes a little digging."

It's a lot like F. E. Hartzler says this month in his article, "Basic Principles in Fertilizer Merchandising:"

*"Merchandising is always the scientific part of selling goods to customers. As yet the fertilizer industry is not prepared to talk about merchandising."*

Thus, like Hartzler, we started with *basic principles*, trying constantly to *apply them to your industry*. We certainly were encouraged that we were on the right track with comments such as these which were volunteered at the Greenbrier last month:

*"As long as you keep applying basic principles to problems in the farm chemicals industry, your approach is sound. We can go to text books on marketing for basics, but somehow you have come up with new ideas . . . new studies on selling . . . and authors who know what they're talking*

*about in our field of work."*

Yes, applications of basic marketing principles makes the big difference!

With industry's new awareness of marketing problems and NPFI's publication of the *Fertilizer Salesman's Handbook*, our new marketing approach couldn't have been better timed. Our article last month about Sohio's project to disseminate these Handbooks among agricultural leaders in the state of Ohio has created a demand for Handbooks from companies which apparently were not aware of NPFI's new promotion tool. One limestone association official wrote:

*"As this association is vitally interested in the distribution of agricultural lime here in . . . along with our other processed materials of road stone, etc., I am sure that through this booklet we will be able to use new ideas for the selling of ag lime. . . ."*

A southern fertilizer company general manager wrote: "Although our administrative office is not located in the state of Ohio, we do have various sales representatives covering the State of Ohio and are very much interested in them having your booklet (NPFI Handbook) for both educational and reference purposes . . . If possible, we would appreciate your mailing us five of your booklets entitled "Fertilizer Salesman's Handbook" and bill us accordingly."

FARM CHEMICALS is proud to have been a part of this "Operation Fertilizer Salesman's Handbook." It proves conclusively that the fertilizer and lime industries are hungry for *good* marketing information. We're convinced that if *just one fertilizer manufacturer in each state* would undertake the same type of project that it could not help but be reflected in banner fertilizer sales for the whole industry.

**This is a six-month report.** Any contemplation of what success we'll have with our new marketing approach is pure guesswork. Some may say we're "ahead of our times" . . . others may say we were "too late." Still others will shrug it off with the old line, "you'll never get the fertilizer industry to change its ways."

We'll leave the forecasting up to the experts. One thing we're sure about is that we've never had a greater editorial challenge—a real opportunity to provide a unique service to an industry which is on the threshold of a new era of selling.

We aim to stick with it—and we'll encourage others to climb on the bandwagon!

GORDON L. BERG

FARM CHEMICALS



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